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BOOK

VOLUME 1443



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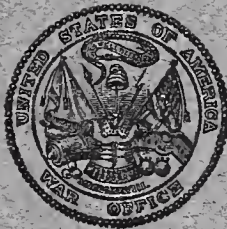


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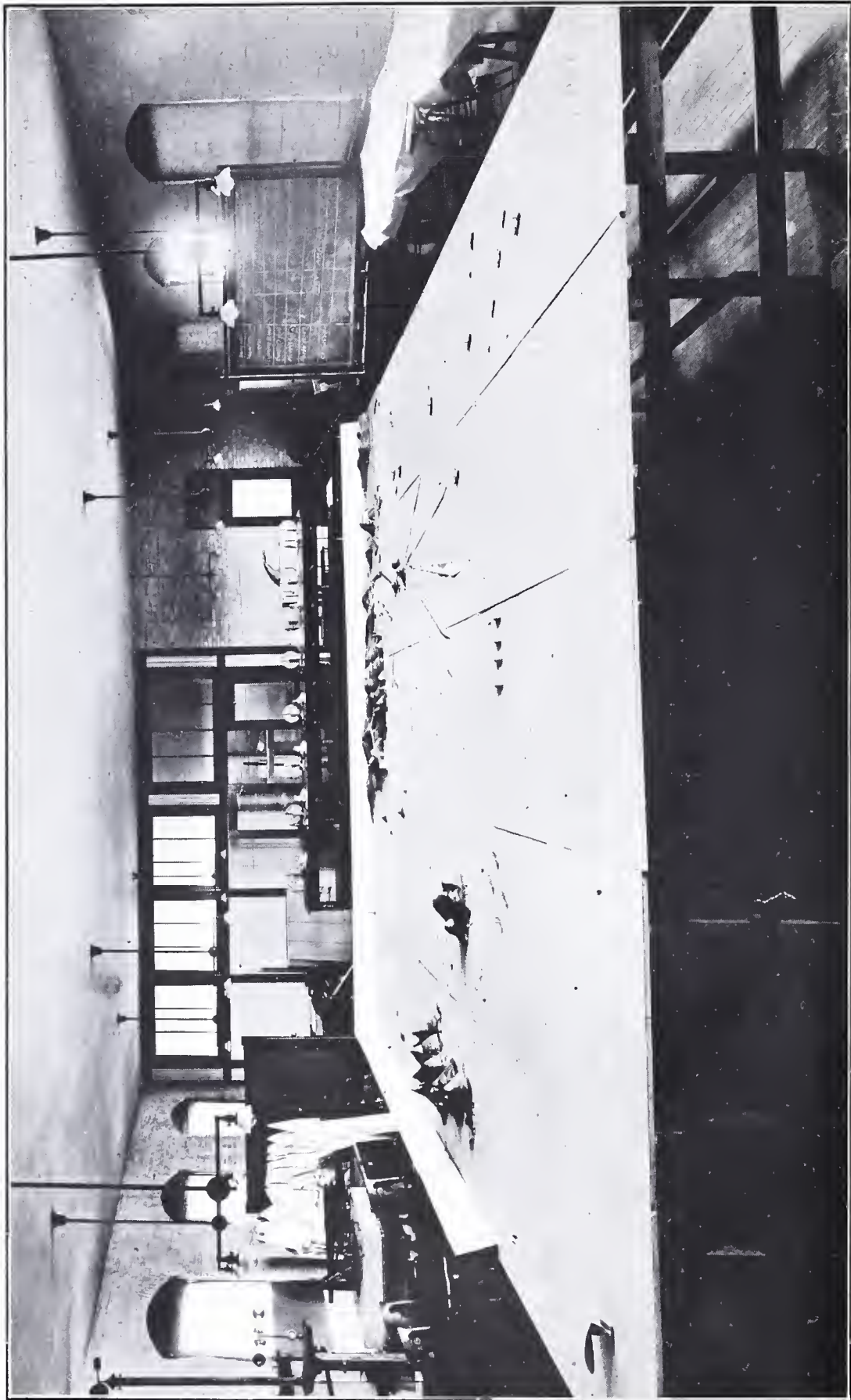
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WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF

COAST ARTILLERY WAR GAME



WASHINGTON
GOVERNMENT PRINTING OFFICE
1913



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COAST ARTILLERY WAR GAME.

CHAPTER I.

PRELIMINARY INSTRUCTION.

I. GENERAL HYDROGRAPHIC FEATURES OF THE COAST DEFENSE COMMAND.

1. Name, location, kind, and radius of illumination and range from station of each lighthouse in the coast defense command.

2. Name, location, and range of buoys or other channel marks.

NOTE.—The following is the system of buoyage in United States waters:

(a) In coming from seaward, *red* buoys mark the starboard or *right* side of the channel, and *black* buoys the port or *left* hand side.

(b) Dangers and obstructions which may be passed on either side are marked by buoys with *black* and *red horizontal* stripes.

(c) Buoys indicating the fairway are marked with *black* and *white vertical* stripes and should be passed close.

(d) Sunken wrecks are marked by the red and black obstruction buoys. In foreign countries green buoys are frequently used to mark sunken wrecks.

(e) Quarantine buoys are yellow.

(f) As white buoys have no special significance they are frequently used for special purposes not connected with navigation.

(g) The starboard and port buoys are numbered from the seaward end of the channel, the *black* bearing the *odd* and the *red* the *even* numbers.

(h) Perches with balls, cages, etc., when placed on buoys, are at turning points, the color and number indicating on which side they shall be passed.

3. General direction, name, width, and depth of channels, with a statement of what class of war vessels can navigate same.

4. Name and location of shoals, and ranges thereto.

5. General location of water areas capable of submarine defense.

6. Location, numerical designation, and size, of all searchlights of the coast defense command and approximate range of beam.

7. Ranges to all prominent points and landmarks along the shore.

8. Location of, range to, and general features of all practicable landing places for bodies of troops.

II. DEFINITIONS: SHIPS IN GENERAL.

Abaft.—Toward the stern of the vessel.

Aft.—Toward the stern of the vessel.

Beam.—The widest part of a vessel's hull.

Bilge.—The flat underwater portion of a vessel; the lowest part except keel.

Bilge keel.—Finlike ribs projecting from the outer bilge on some ships, to prevent rolling.

Bridge.—An athwartship platform or platforms, surrounded by a canvas-covered railing, forward of foremast, connected with chart room and conning tower. The captain and navigating officers take station on the upper bridge, or bridge proper. All signals are made or hoisted from the lower bridge.

Bulkhead.—Partition running from side to side beneath the decks; a collision bulkhead is the first partition forward, near the bow.

Cable.—Anchor chain.

Capstan.—The windlass for winding in anchor chain.

Chart room.—The captain's office at sea, usually on or near the bridge.

Conning tower.—The small, heavily armored, ship-control station forward of the foremast.

Dead reckoning.—Method of ascertaining the approximate position of a vessel from the course steered and the distance run; used in times of heavy weather or protracted fog.

Division.—Usually four battleships or cruisers, commanded by a rear admiral.

Ebb tide.—The falling tide.

Fathom.—Six feet, used in designating depths of water.

Fleet.—Two or more squadrons.

Flood tide.—Rising tide.

Flotilla.—Two or more groups of destroyers (torpedo boats or submarines) assigned to the command of a flotilla commander.

Fo'castle.—"Fore castle," seaman's quarters (forward).

Fore-and-aft.—Lengthwise with the ship.

Forward.—Toward the bow or front of the vessel.

Funnel.—Smokestack of a naval vessel, preferred on account of "stack" being confused with "track," when transmitted by telephone.

Group.—A number of destroyers (torpedo boats or submarines), usually five, associated together for administration and operations.

Guard ship.—Ship designated daily to perform certain duties, distinguished by flying from foremast a white flag (5 of clubs) with 5 clubs (at night a red light at fore).

Keel.—The central longitudinal beam at the extreme underside of the vessel, the foundation of the entire structure.

Knot.—6,080.27 feet, equals $1\frac{1}{7}$ land miles.

NOTE.—One-half mile per hour equals yards per second.

Lee side.—Side of the vessel away from the wind, or from hostile fire.

Log (log book).—Official daily record of the proceedings on board ship, weather, wind velocity, distance traveled, etc.

Midship.—Toward the middle or “waist” of a vessel, equally distant from bow and stern.

Pilot house.—Sheltered position connected with the bridge from which the vessel is steered.

Port.—Left side of a vessel when facing the bow.

Quarter.—The aftermost portion of a vessel's side.

Quarter deck.—After part of the spar (or upper) deck.

Screw.—The propeller of the ship.

Scuppers.—Drainage “gutter” along the decks at rails.

Smoke pipe.—Funnel or smokestack.

Soundings.—The depth of the water expressed in fathoms, and measured by means of a sounding line.

Squadron.—Usually two divisions of battleships or cruisers.

Starboard.—Right side of a vessel when facing the bow.

Stem.—Extreme forward end of body of ship.

Stern.—Extreme after end of body of ship.

Thwartship.—Crosswise of the ship.

Weather side.—Side of vessel toward the wind.

III. USEFUL GENERAL DATA.

Distance to horizon at sea.

Height of eye.		Distance.		Height of eye.		Distance.	
		<i>Yards.</i>	<i>Miles.</i>			<i>Yards.</i>	<i>Miles.</i>
5 feet.....		4,820	2.7	90 feet.....			11.6
10 feet.....		6,800	3.9	100 feet.....			12.2
20 feet.....		9,620	5.5	200 feet.....			17.3
30 feet.....	11,800	6.7		300 feet.....			21.2
40 feet.....	13,360	7.8		400 feet.....			24.5
50 feet.....	15,240	8.7		500 feet.....			27.4
60 feet.....		9.5		600 feet.....			30.0
70 feet.....		10.2		800 feet.....			34.7
80 feet.....		10.9		1,000 feet.....			38.7

Approximate rule: $H = \frac{3}{2} M^2$.

Where M=the distance in miles and H=the height in feet.

Velocity of sound.

	<i>Miles.</i>		<i>Miles.</i>
1 second.....	0.21	11 seconds.....	2.31
2 seconds.....	.42	12 seconds.....	2.52
3 seconds.....	.63	13 seconds.....	2.73
4 seconds.....	.84	14 seconds.....	2.94
5 seconds.....	1.05	15 seconds.....	3.15
6 seconds.....	1.26	16 seconds.....	3.36
7 seconds.....	1.47	17 seconds.....	3.57
8 seconds.....	1.68	18 seconds.....	3.78
9 seconds.....	1.89	19 seconds.....	3.99
10 seconds.....	2.10	20 seconds.....	4.20

The above estimates of the velocity of sound are for calm weather and the usual summer temperature. Extreme heat and extreme cold affect the velocity of sound in that they will make sound travel faster or slower, respectively.

IV. CLASSES OF VESSELS.

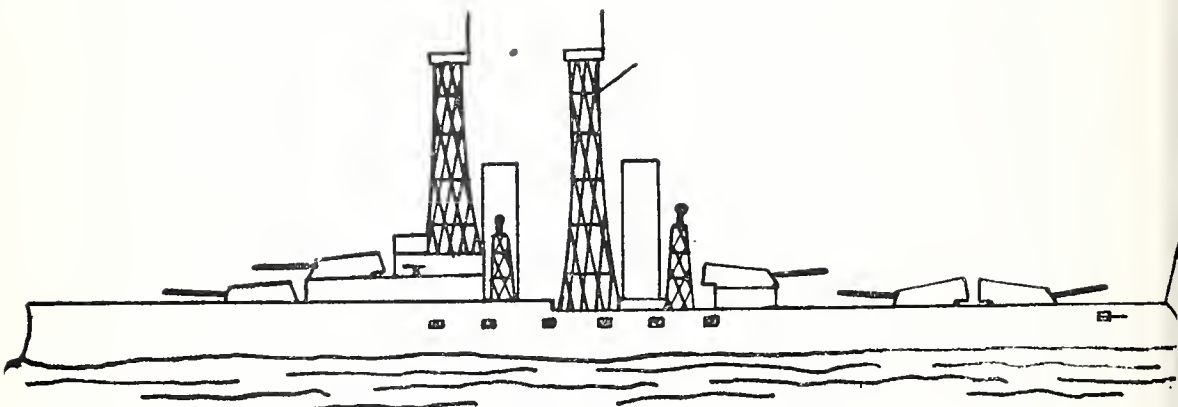
The following are the principal kinds of vessels which may be encountered in a coast defense command:

(a) Naval vessels.

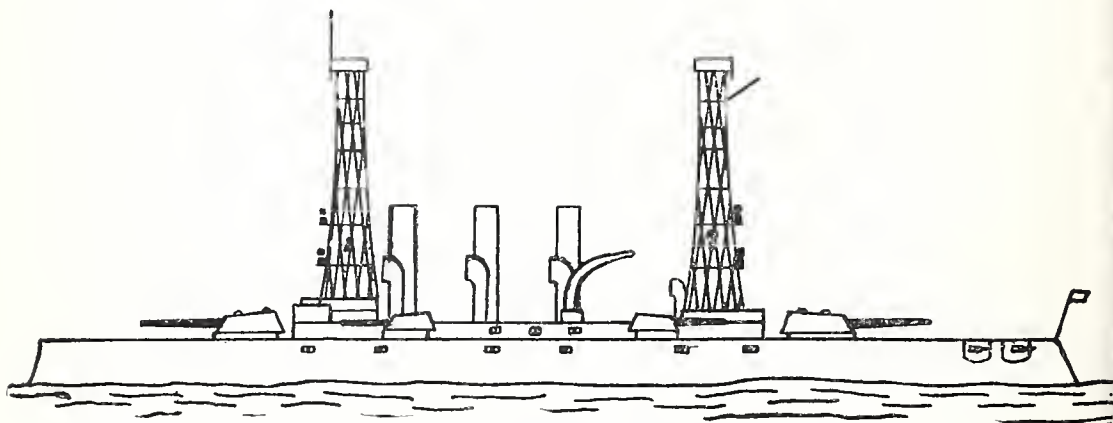
(b) Revenue cutters, lighthouse tenders, artillery boats, and all other Government vessels.

(c) Commercial craft.

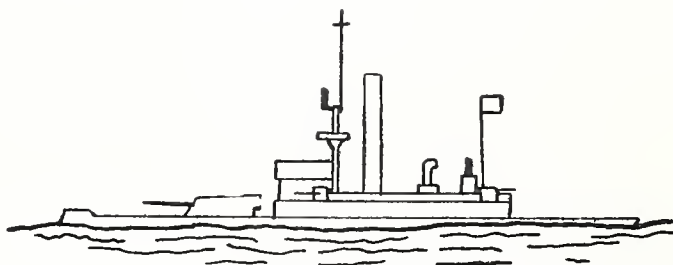
The following are silhouettes of the more important classes of these vessels:



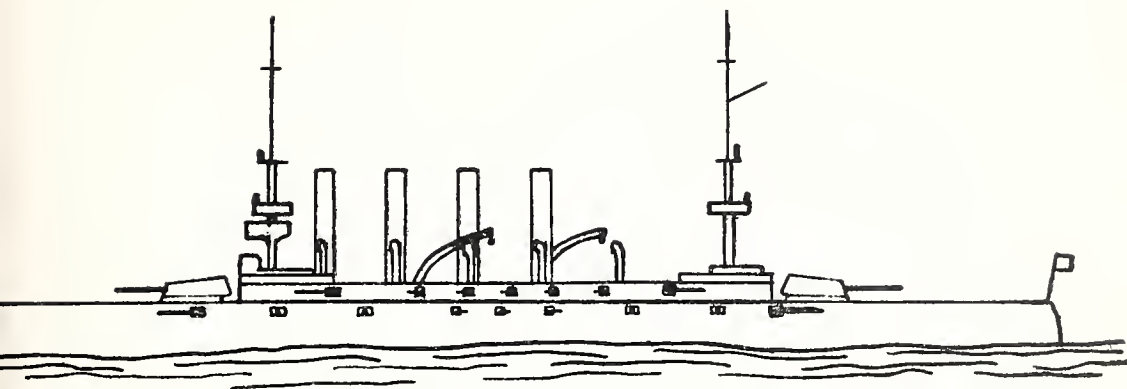
U. S. battleship *North Dakota*.



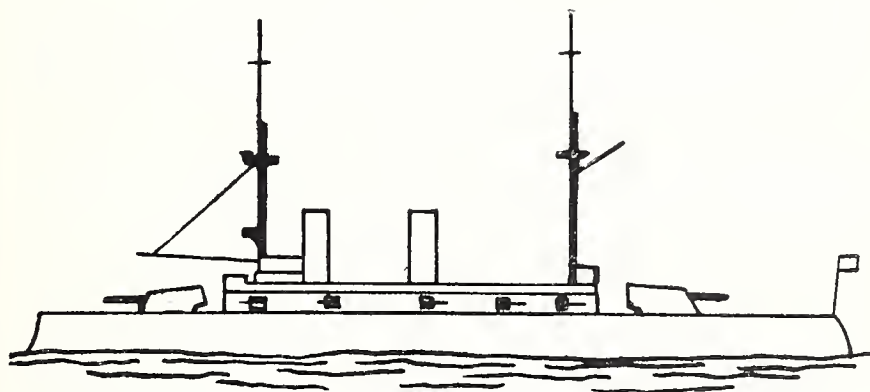
U. S. battleship *Connecticut*.



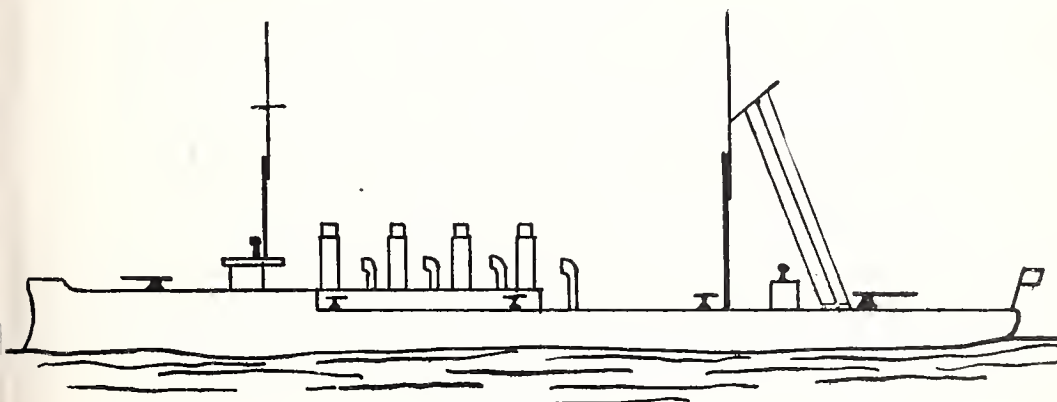
Monitor *Tallahassee*.



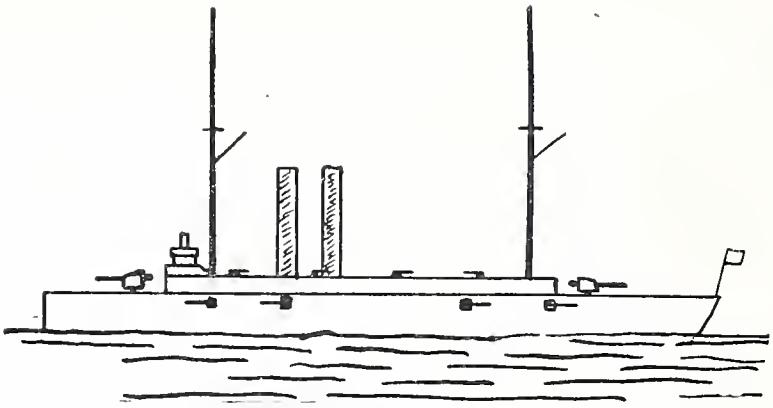
Armored cruiser *North Carolina*.



Protected cruiser *Olympia*.



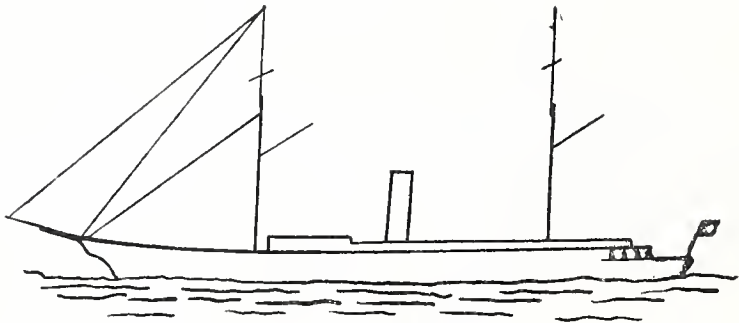
Scout *Salem*.



Gunboat *Denver*.



Destroyer *Terry*.

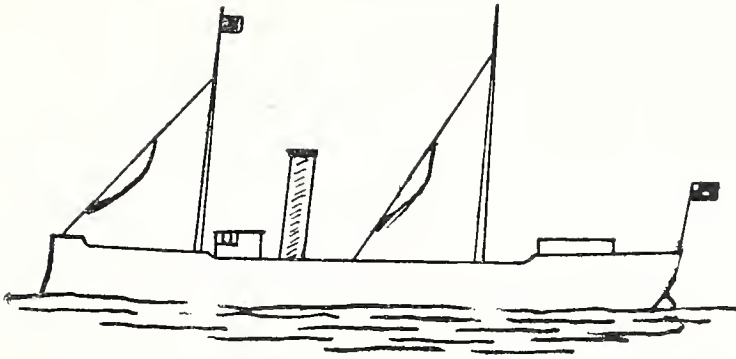


President's yacht *Mayflower*.

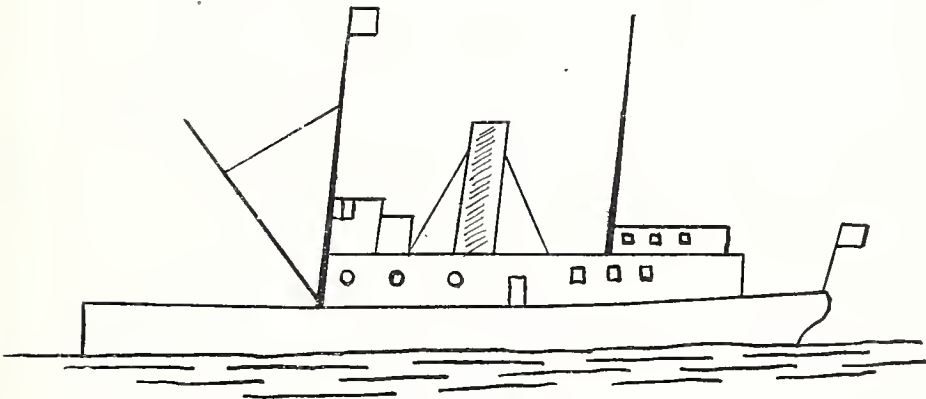


Collier *Hector*.

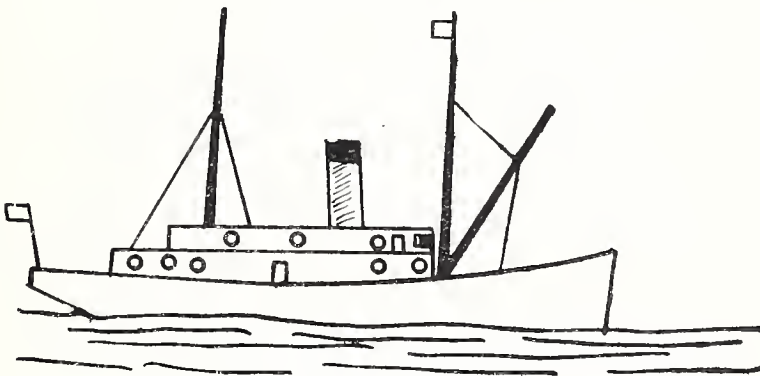
For further information as to the general characteristics of warships, see "Armor and Ships," pages 56-60.



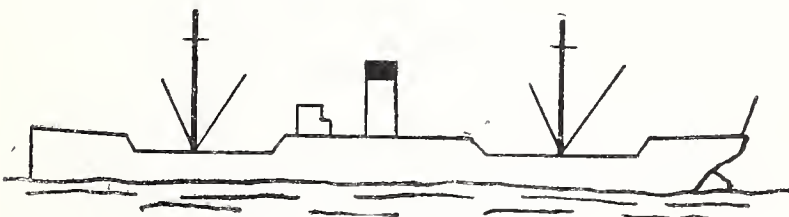
Revenue cutter *Onondaga*.



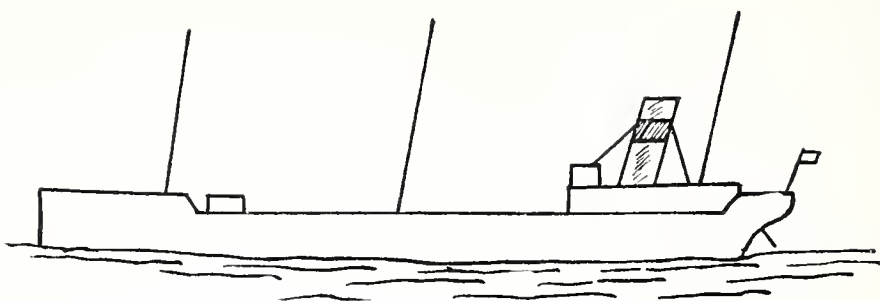
Mine planter *Mills*.



Lighthouse tender *Maple*.



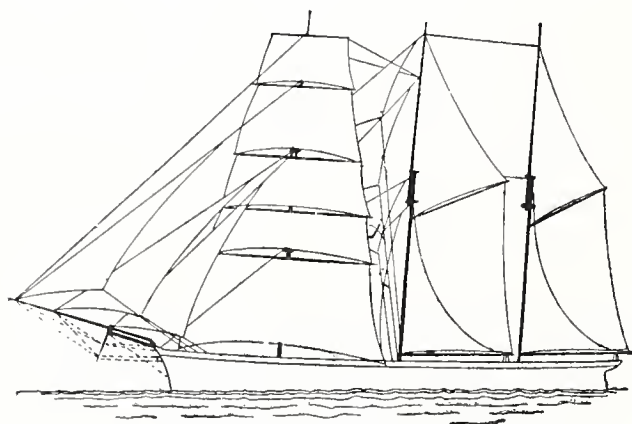
Tramp steamer.



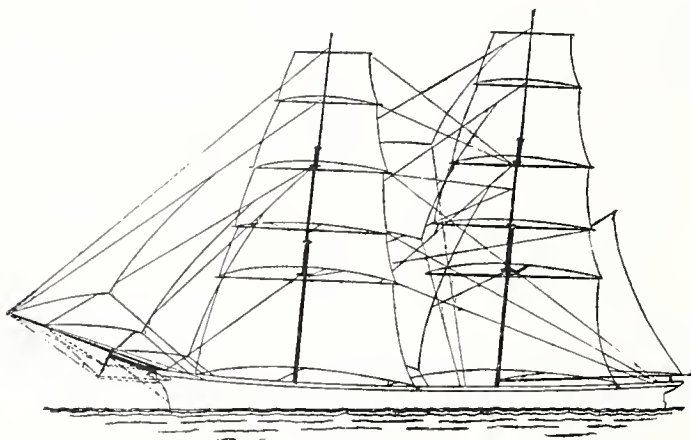
Tank steamer.



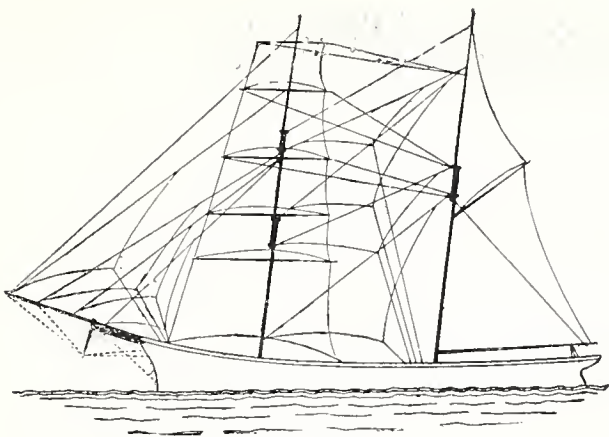
Whaleback.



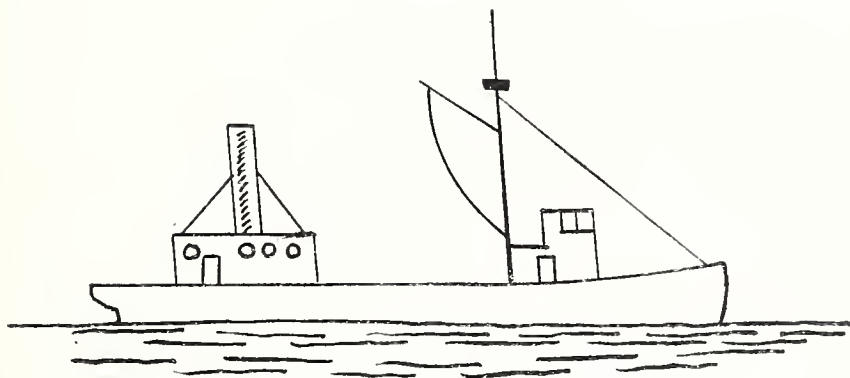
Barkentine.



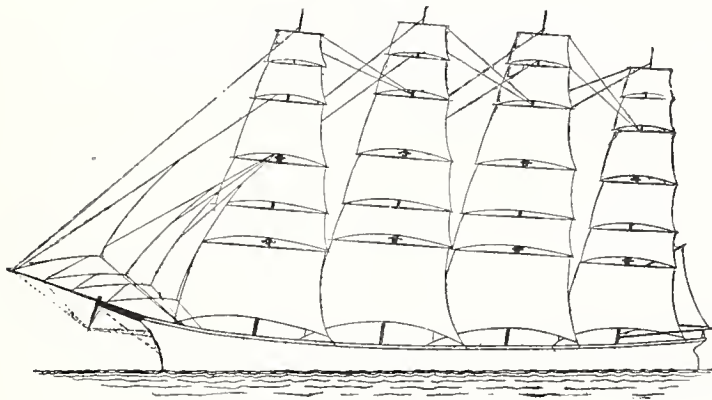
Brig.



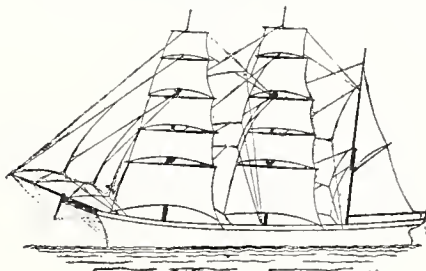
Brigantine.



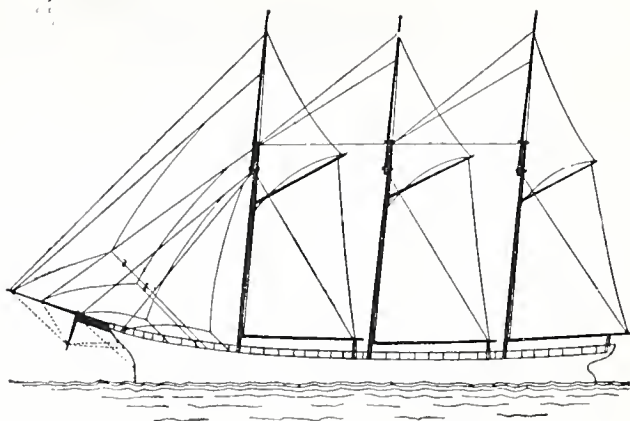
Menhaden fisherman.



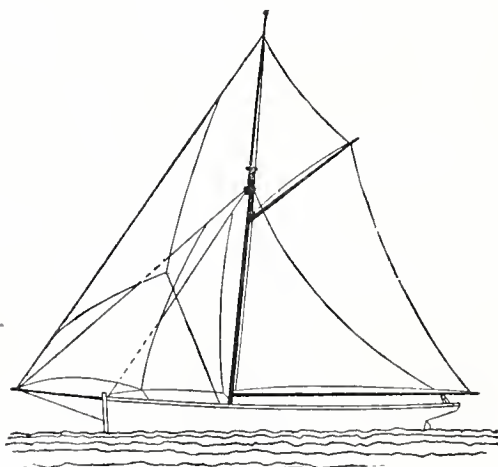
Four-masted ship (square rigged).



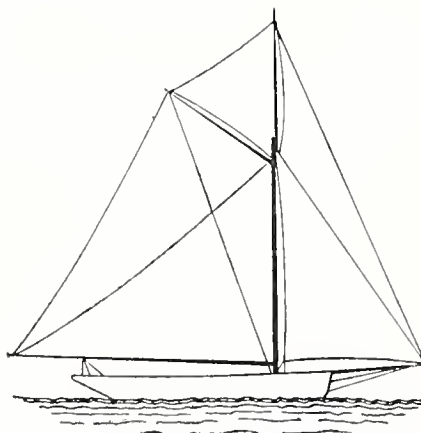
Bark.



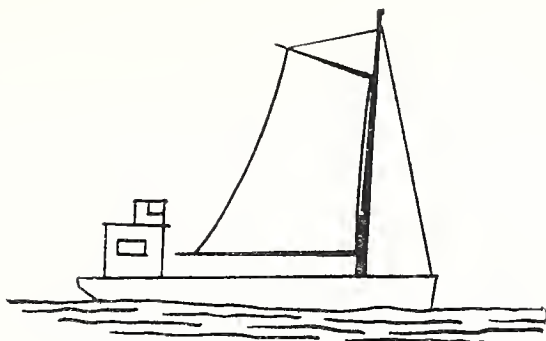
Schooner.



Cutter.



Sloop.



Crabber.

V. FLAGS, SIGNALS, LIGHTS, ETC.

The President's flag.—The flag of the President shall be of blue bunting, with the official coat of arms of the United States of suitable size in the center, and shall be 10.20 feet hoist, 14.40 feet fly. (A. R., 217, 1910.)

The Secretary of War's flag.—The flag of the Secretary of War shall be of scarlet bunting, measuring 12 feet fly and 6 feet 8 inches hoist. In each of the four corners shall be a 5-pointed white star with one point upward. * * * In the center of the flag shall be the official coat of arms of the United States, of suitable size. (A. R., 219, 1910.)

The Assistant Secretary of War's flag.—Same as the Secretary's flag except the field is of white and stars scarlet.

The Secretary of the Navy's flag.—Rectangular flag of blue bunting with white anchor in center and four white stars, one in each corner.

The Assistant Secretary of the Navy's flag.—Rectangular flag of white bunting with blue anchor in center with four blue stars, one in each corner.

Flag of a rear admiral, United States Navy.—Rectangular blue flag, with one (or two) white stars. When two or more flag officers of the same grade meet, the senior only flies the blue flag, and all others red.

Flag of Chief of Coast Artillery or brigadier general.—Rectangular flag of scarlet bunting with one white star in center. Flag of major general has two stars. (A. R., 240, 1910.)

Coast defense commander's flag.—Rectangular flag of scarlet bunting with Coast Artillery Corps device in yellow. (A. R., 240, 1910.)

Post commander's flag.—Small triangular pennant, third nearest staff blue with white stars, remaining two-thirds scarlet. (A. R., 240, 1910.)

District engineer officer's flag.—Rectangular flag of scarlet bunting with Engineer Corps device in white at center.

Naval Militia flag.—Blue rectangular flag with blue anchor on yellow square at center.

Battle efficiency pennant.—Red triangular pennant with black ball in center flown from foremast.

Revenue-cutter flag.—Rectangular flag with blue field, with United States coat of arms in center, and 13 red and white vertical bars. This flag is flown from the fore of all revenue cutters.

United States storm signals are as follows:

Storm-warning flags.—A red flag with a black center indicates that a storm of marked violence is expected. The pennants displayed with the flags indicate the direction of the wind; red, easterly (from northeast to south); white, westerly (from southwest to north). The pennant above the flag indicates that the wind is expected to blow from the northerly quadrants; below, from southerly quadrants. By night, a red light indicates easterly winds, and a white light above a red light, westerly winds.

Hurricane warnings.—Two red flags, with black centers, displayed one above the other, indicate the expected approach of tropical hurricanes, and also of those extremely severe and dangerous storms that occasionally move across the lakes and northern Atlantic coast. Hurricane warnings are not displayed at night.

NOTE.—Storm signals are displayed by the United States Weather Bureau at 141 stations situated along the Atlantic and Gulf coasts, and at 27 stations situated along the Pacific coast of the United States.

Colors in United States Navy.—At morning “colors” the drum gives three rolls and the bugle sounds three flourishes, all officers and men face the ensign and stand at attention, and sentries under arms come to the position of “present.” At the end of the third roll the ensign is started up and hoisted smartly to the peak or truck, and the bands play the Star-Spangled Banner, at the conclusion of which all officers and men salute.

The same ceremony is observed at sunset “colors,” the ensign to be started from the peak or truck and the Star-Spangled Banner to begin at the end of the third roll. The ensign is not lowered hurriedly.

Upon hoisting the ensign at sunrise the usual honors and ceremonies are paid, and they are not repeated at 8 a. m. (United States Navy Regulations, 1909, par. 162.)

A ship of the Navy entering port at night hoists her ensign at daylight for a short period, to enable the authorities of the port and ships of war present to determine her nationality. It is customary for other ships of war to show their colors in return. (United States Navy Regulations, 1909.)

The distinctive mark of a ship of the Navy in commission, other than the national ensign, is a pennant at the masthead.

The distinctive flag of an admiral or senior officer present is displayed day and night. In two-masted ships all such flags and pennants are displayed from the main; in single-masted ships from

the truck; and in mastless ships, from the loftiest and most conspicuous hoist.

When, in a port of the United States, a flag officer is absent from his command afloat for a period exceeding 24 hours, his flag is hauled down, and the command devolves upon the line officer next in rank present in the fleet, squadron, or division, subject to any directions from the flag officer.

If a flag officer is absent from his flagship at night with the intention of returning within 24 hours, his absence is indicated by three lights displayed at the peak.

All flagships when in port, or at sea in company with other ships, carry a light at the mainmast head from sunset to sunrise. This light is not, however, carried at the same time as the lights indicating the absence of a flag officer.

How to half-mast the ensign.—In half-masting the ensign it shall, if not previously hoisted, be first hoisted to the peak or truck with the usual ceremonies, and then lowered to half-mast. Before lowering from half-mast it shall be first hoisted to the truck or peak and then lowered with the usual ceremonies. (United States Navy Regulations, 1909.)

"Dipping" the flag.—This is a form of salute or courtesy, sanctioned by international usage, employed by ships of commerce toward other ships and between such ships and the shore.

No ship of the Navy lowers her sails or dips her ensign unless in return for such compliments.

When any vessel salutes a ship of the Navy by dipping her national ensign, it is returned dip for dip. If before 8 a. m. or after sunset, the colors are hoisted, the dip returned, and, after suitable interval, the colors hauled down.

The flag of a military post will not be dipped by way of salute or compliment. (United States Army Regulations, 1910.)

Position of ensign to denote if ship is at anchor or under way.—Vessels of the United States Navy at anchor display the national ensign at the after staff and the union jack at the bow between 8 a. m. and sunset; also between sunset and 8 a. m., when other vessels of the United States Navy get under way or when it becomes necessary to return the dip of a commercial ship.

Vessels of the United States Navy under way display the national ensign at the gaff on the rear mast.

The union jack.—When at anchor in port, the union jack is to be displayed in good weather from a staff shipped in the bows or on the head booms forward when colors are hoisted. It is not to be displayed while coaling ship, when wash clothes or scrubbed canvas are up, when sails are loosed to dry, nor on square-rigged ships when topgallant yards are not crossed.

The jack is hoisted at the fore as a signal for a pilot. A gun may be fired to call attention to it.

The jack hoisted at the mizzen, or at a yardarm, denotes that a general court-martial or court of inquiry is in session. It is to be hoisted (and, if in port, a gun fired) when the court meets and to be hauled down when the court adjourns.

Meal pennant.—A red pennant is hoisted at the yardarm during the time the crew is at meals on board vessels at anchor, whether or not the colors are hoisted. This pennant will be shown for this purpose without reference to the flagship.

At sea, or under way, in formations, it shall be used as reserve-speed pennant. (Boat Book, United States Navy, 1908, par. 133, p. 95.)

This pennant is of interest to the Coast Artillery as showing when not to make boarding visits.

How to distinguish divisions of the fleet and ships of a division.—Black bands painted around the two forward funnels are used for this purpose, the band bordering the top of the funnel counting as one.

The number of bands around the forward funnel indicates the division of the fleet to which the ship belongs; the number around the second funnel indicates the ship's number in the division.

For example: A ship showing three bands around the forward funnel and two around the second is the second ship of the third division.

The vessels of the group of destroyers (or torpedo boats) will be distinguished by the following at the foremast head:

No. 1. Pennant of group commander.

No. 2. Sphere.

No. 3. Triangle, apex up.

No. 4. Three cross bars.

No. 5. Double triangle, base at top and bottom.

Speed cones.—Speeds for division and fleet maneuvers are "full," "standard," two-thirds (standard), and one-third (standard). The "standard" speed is fixed by the admiral's order for the ships to get under way. "Full" speed is 1 knot greater than "standard."

During the day, when under way, the speed of each ship is indicated by a colored yellow or red cone $2\frac{1}{2}$ feet at base and 3 feet in height.

The meanings of the various positions of the speed cone are as follows:

(1) Hoisted at starboard (or port) yard, apex up—"Starboard (or port) engine going ahead at standard speed."

(2) Hoisted one-third or two-thirds of the way to starboard (or port) yardarm, apex up—"Starboard (or port) engine going ahead at one-third or two-thirds of standard speed."

(3) Lowered out of sight—"Engines stopped."

(4) Hoisted one-third or two-thirds of way to starboard (or port) yardarm, apex down—"Starboard (or port) engine backing at one-third or two-thirds of standard speed."

(5) Hoisted at starboard and port yardarms, apex down—"Engines backing, standard speed."

(6) The full-speed (meal) pennant hoisted at the yardarm next to the speed cone (apex up) indicates "Going ahead at *full speed* or more than full speed."

Whistle signals for vessels passing or crossing.—(1) One short blast means that the port sides of the two vessels are to pass each other.

(2) Two short blasts mean that the starboard sides of the two vessels are to pass each other.

NOTE.—This rule can be remembered by the fact that one blast means one syllable (port); two blasts, two syllables (starboard).

The vessel that whistles first has the right of way.

[Extract from regulations for preventing collisions on inland waters.]

Steam vessels.—A steam vessel when under way shall carry—

Masthead light.—On or in front of the foremast, or if a vessel without a foremast, then in the fore part of the vessel, a bright white light so constructed as to show an unbroken light over an arc of the horizon of 20 points of the compass, so fixed as to throw the light 10 points on each side of the vessel, namely, from right ahead to 2 points abaft the beam on either side, and of such character as to be visible at a distance of at least 5 miles.

Side lights.—On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to 2 points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least 2 miles.

On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to 2 points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

These red and green side lights shall be fitted with inboard screens projecting at least 3 feet forward from the light so as to prevent the lights from being seen across the bow.

Range lights.—A seagoing steam vessel when under way may carry an additional white light similar in construction to the light mentioned above. These two lights shall be so placed in line with the keel that one shall be at least 15 feet higher than the other and in such a position with reference to each other that the lower light shall be forward

of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

Steam vessels when towing.—A steam vessel when towing another vessel shall, in addition to her side lights, carry two bright white lights in a vertical line, one over the other, not less than 3 feet apart, and when towing more than one vessel shall carry an additional bright white light 3 feet above or below such lights if the length of the tow measured from the stern of the towing vessel to the stern of the last vessel towed exceeds 600 feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white masthead light or the after range light mentioned above.

Such steam vessels may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

Lights for sailing vessels and vessels in tow.—A sailing vessel under way or being towed shall carry the same lights as are prescribed by article 2 for a steam vessel under way, with the exception of the white lights mentioned therein, which they shall never carry.

Anchor lights.—A vessel under 150 feet in length, when at anchor, shall carry forward, where it can be best seen, but at a height not exceeding 20 feet above the hull, a white light in a lantern so constructed as to show a clear, uniform unbroken light visible all around the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upward in length, when at anchor, shall carry in the forward part of the vessel, at a height of not less than 20 and not exceeding 40 feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall not be less than 15 feet lower than the forward light, another such light.

The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

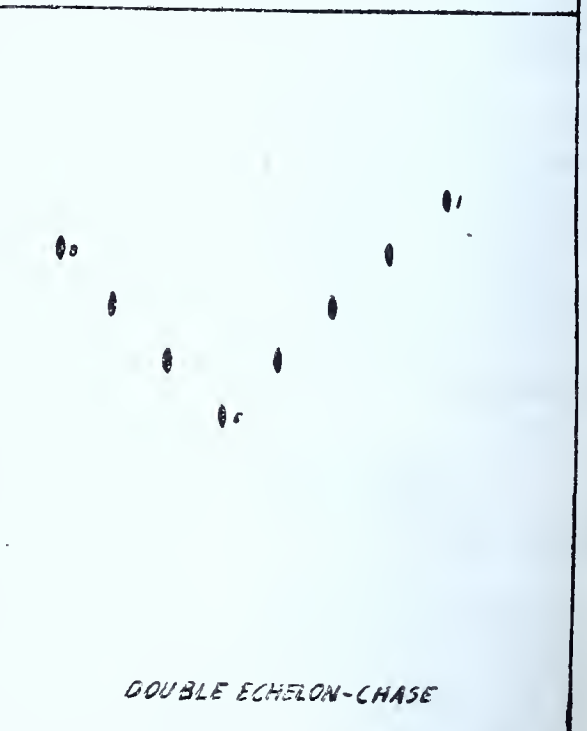
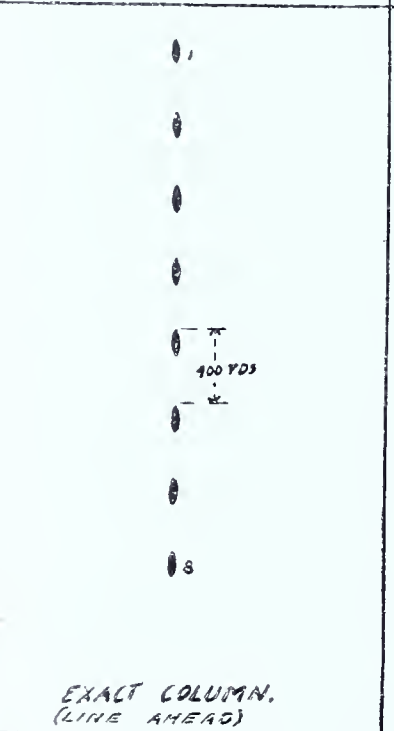
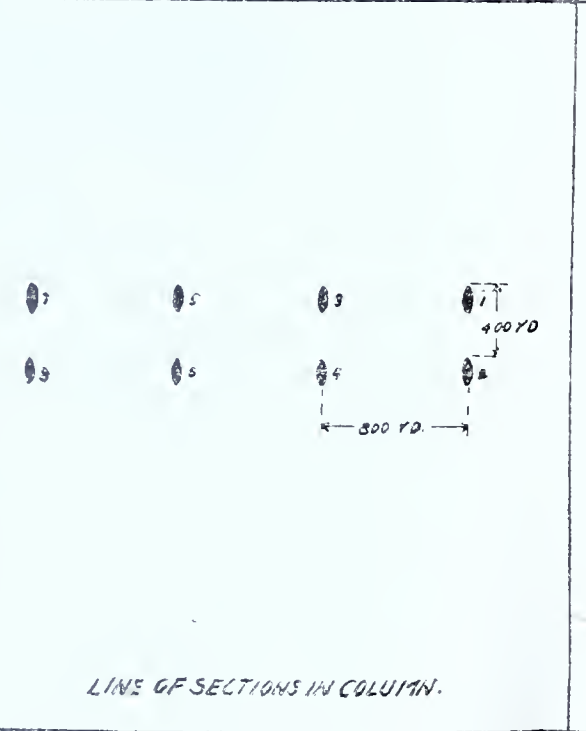
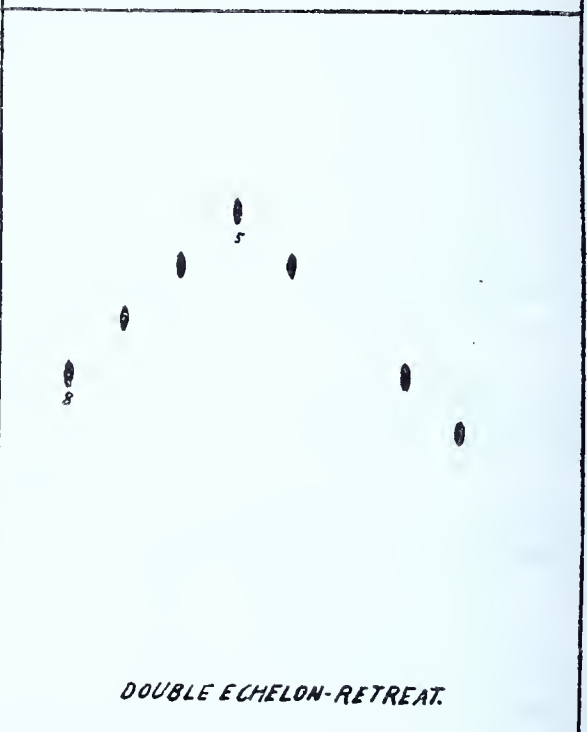
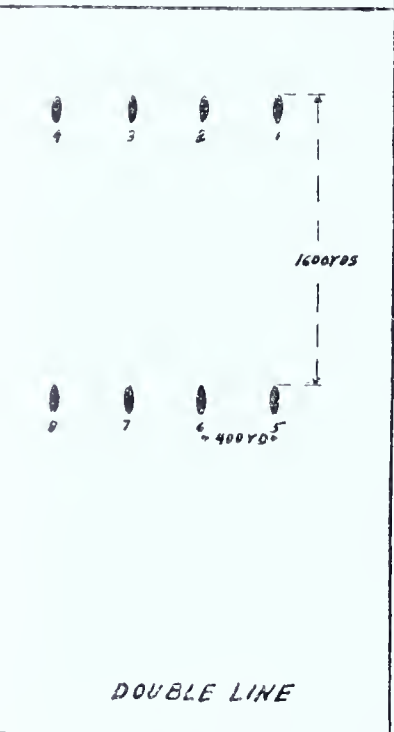
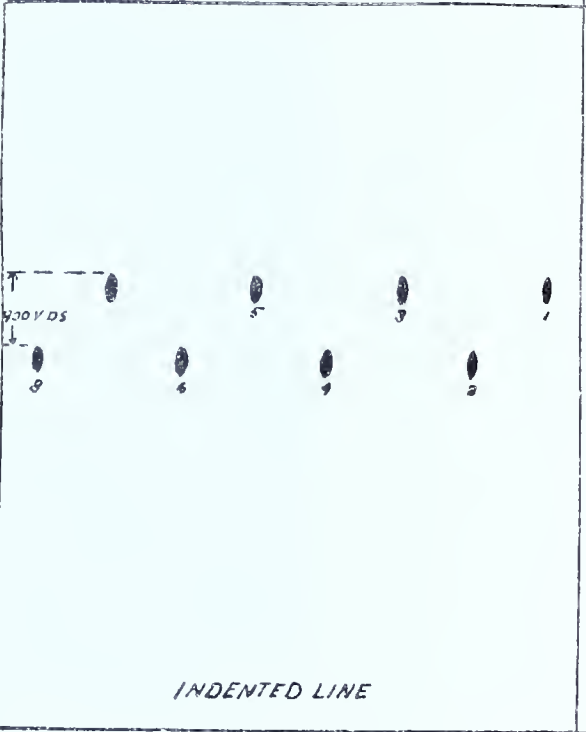
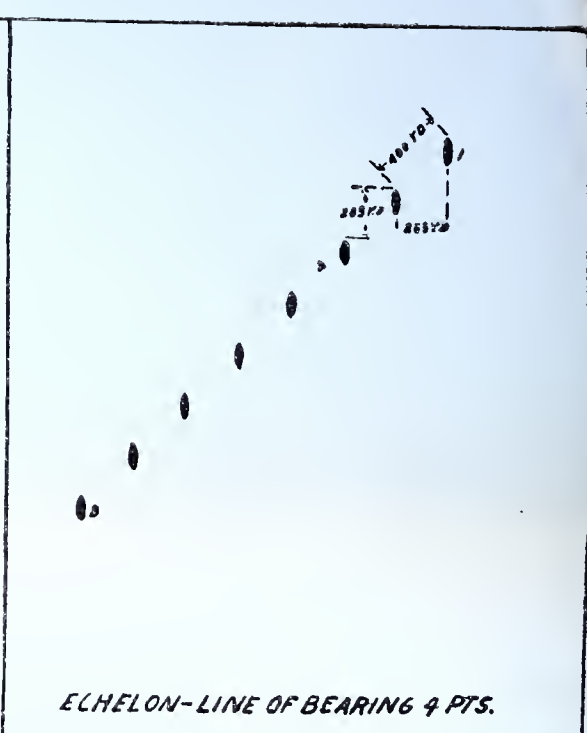
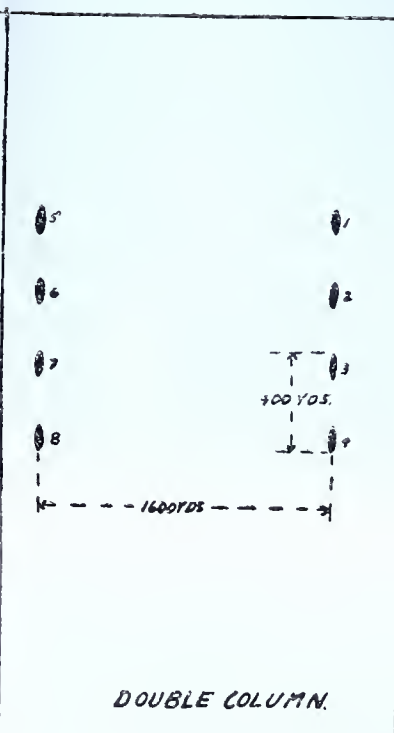
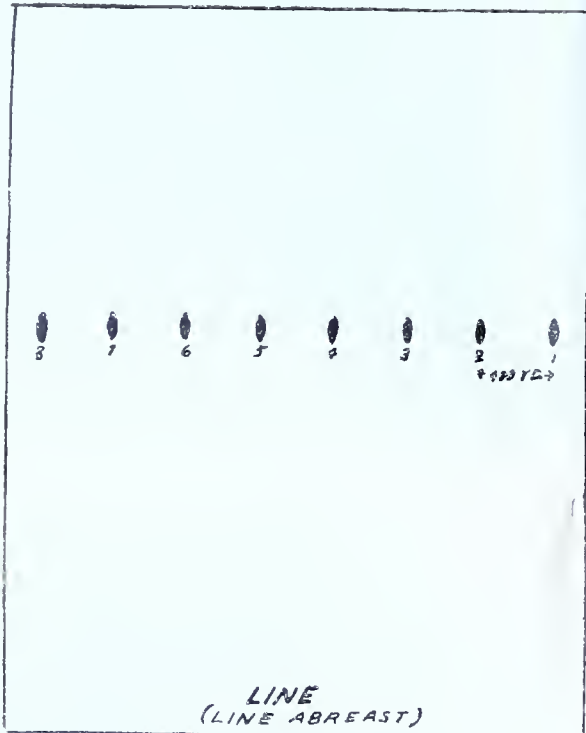
Sound signals for fog.—All signals prescribed by this article for vessels under way shall be given:

By steam vessels on the whistle or siren.

By sailing vessels and vessels towed, on the foghorn.

The words "prolonged blast" used in this article shall mean a blast of from 4 to 6 seconds' duration.

A steam vessel shall be provided with an efficient whistle or siren, sounded by steam or some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient fog horn; also with an efficient bell. A sailing vessel of 20 tons gross tonnage or upward shall be provided with a similar foghorn and bell.



In fog, mist, falling snow, or heavy rainstorm, whether by day or night, the signals described in this article shall be used as follows, namely:

Steam vessels under way.—A steam vessel under way shall sound, at intervals of not more than 1 minute, a prolonged blast.

Sailing vessel under way.—A sailing vessel under way shall sound, at intervals of not less than 1 minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession, and when with the wind abaft the beam, three blasts in succession.

Vessels at anchor.—A vessel when at anchor shall, at intervals of not more than 1 minute, ring the bell rapidly for about 5 seconds.

Vessels towing or towed.—A steam vessel when towing, shall, instead of the signals prescribed above ("Steam vessels under way"), at intervals of not more than 1 minute, sound three blasts. A vessel towed may give this signal and she shall not give any other.

Steam vessels shall keep out of the way of sailing vessels.—When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

Narrow channels.—In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or mid-channel which lies on the starboard side of such vessel.

Distress signals.—When a vessel is in distress and requires assistance from other vessels or the shore the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime—

A continuous sounding with any fog-signal apparatus, or firing a gun.

At night—

(1) Flames on the vessel as from a burning tar barrel, oil barrel, and so forth.

(2) A continuous sounding with any fog-signal apparatus, or firing a gun.

VI. FLEET FORMATIONS.

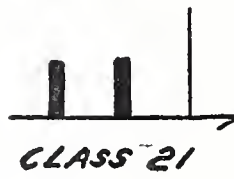
The diagram facing this page shows the various formations of a squadron of 8 ships.

NOTE.—"Line ahead" and "Line abreast" (par. 545, D. R. C. A.) correspond respectively with "exact column" and "line."

VII. CLASSIFICATION OF SHIPS.

Vessels may often be identified by description, using the number of funnels and masts as basis of classification, as, e. g., class "12," where the first digit "1" indicates the number of funnels, and the

second digit "2" the number of masts. Other examples are given below:



VIII. ARTILLERY COMMANDS.

At artillery drill great care must be used to give the exact commands, which are formulated with the idea of using the minimum of words best adapted to the standard means of communication. As a rule, officers do not give sufficient attention to this important matter, and often the resulting confusion is attributed to poor communication or ill-trained telephone operators, when in reality the trouble is directly due to badly chosen commands.

Too much importance can not be given to this matter, and during the use of the Coast Artillery War Game those engaging therein will be required to adhere rigidly to the type commands, and any deviations therefrom will be immediately corrected by the director or one of the instructors.

The battle area may be divided into subareas; for example, the Fort Monroe battle area may be divided as follows:

Area outside and to right of Bug Light—Lynnhaven.

Area outside and to left of Bug Light—Horseshoe.

Area inside and to right of Bug Light—Ocean View.

Area inside and to left of Bug Light—Buckroe.

The battle area of other defenses can be subdivided in a similar manner.

In column, ships are numbered from the head of the column to the rear.

In line, ships are numbered from the starboard ship to the left.

In assigning targets the following method is used, a dash indicating a pause in giving command to enable the telephone operator to repeat the message:

1. Target—. 2. Area—. 3. Name (or type of an isolated ship; or division; ship number—); the various observers addressed, when on target, report, "B' (B'' or Emergency) On Target," and the command of execution is given, 4. Track.

If the battery commander has reasons to believe there is any doubt as to the proper target, he commands, "B' (B'' or Emergency) Describe," when the observer, without ceasing to track, describes his target. If the description is satisfactory the battery commander adds, "On Target B' (B'' or Emergency)."

For example:

By battery commander:

1. Target—. 2. Ocean View—. 3. Monitor Division—. Line Ahead—. Ship No. 1 (Observers report "B', B'', Emergency, On Target")—. 4. Track—.

1. Target—. 2. Taboguilla—. 3. Submarine Division, Ship No. 3 (Observers report "B', B'', Emergency, On Target")—. 4. B'', Vertical Base, Track—.

1. Target—. 2. Lynnhaven—. 3. Tramp Steamer—. Class 12, Coming In (Observers report "B', B'', Emergency, On Target")—. 4. B', Vertical Base, Track—.

By Fire Commander:

1. Battery Anderson—. Target—. 2. Buckroe—. 3. Bay Line Steamer—. Coming In—. 4. Fire when in range—.

1. Battery Wheeler—. Target—. 2. Boca Chica—. 3. Oil Tank—. Class 13, Going Out—. 4. Fire Two Rounds—. 5. Commerce Firing—.

1. Battery Parke—. Target—. 2. Taboguilla—. 3. Submarine Division—. 4. Ship No. 3—. 5. Commence Firing—.

1. Battery Merritt—. Target—. 2. Panama—. 3. Gunboat Division—. 4. Fire at ships in order in column—. 3 minute intervals—. 5. Commence Firing—.

1. Battery Stevenson—. 2. Target in No. 6—. 3. Fire Two Rounds—. 4. Commence Firing—.

1. Battery Montgomery—. Target—. 2. Buckroe—. 3. Destroyer Division, Double Line—. Second Line—. Ship No. 2—. 4. Fire when at 7000 yards—.

The formation *Line Ahead* can be frequently simulated at drill by a tug towing barges or targets. In such cases, the barges or the targets are numbered from head to rear thus:

1. Target—. 2. Ocean View—. 3. Coal Barge Division—. Going Out—. Ship No. 1 (Tug) or Barge No. 2 (Second barge)—. 4. Emergency System—. 5. Track—.

1. Target—. 2. Horseshoe—. 3. N. Y. P and N. Division—. Barge No. 1—. 4. B', Vertical Base—. 5. Track—.

1. Target—. 2. Lynnhaven—. 3. Mills Division—. Target No. 2—. 4. Track—.

1. Target—. 2. Lynnhaven—. 3. Sand Dredge Division—. Dredge No. 1—. 4. Track—.

CHAPTER II.

THE COAST ARTILLERY WAR GAME.

I. OBJECT.

The object of the Coast Artillery War Game, as developed in the department of artillery and land defense, Coast Artillery School, is to provide an interesting method of instructing officers and enlisted men of the Coast Artillery Corps in certain matters which are essential to a proper performance of their duties in connection with the tactical use of the armament and accessories, including the following:

(a) The characteristic features of the various classes of warships, including general appearance, armor, armament, speed, draft, radius of action, fleet formations, and methods of identification and indication as possible targets.

(b) The forms of attack which may be expected, both from the sea and on land.

(c) The accuracy and rapidity of fire from ships and forts and the probable effect thereof.

(d) The strategic importance of the various coast defense commands.

(e) The hydrographic features of water areas defended, including buoys, lights, etc., their location, appearance, and the information which they impart to navigators.

(f) The capabilities of the various elements of the defense and their best location, i. e., searchlights, base lines, stations, guns, mine fields.

(g) The proper coordination of the elements of the defense.

(h) The preparation of *general defense plans*.

(i) The tactical exercise of fire control and direction, with particular reference to the proper commands, and the transmission of the same over the lines of communication.

II. MATERIAL AND ACCESSORIES.

Description of the board.—The board is made in sections 4 feet square, scale 1''=100 yards, mounted on trestles so as to present a uniform surface and admit of quick removal of sections. The board in use at the Artillery School has thirty sections, giving an area of 480 square feet of working surface.

Each section is of clear white pine, 4' x 4' x 1'', braced underneath by means of three battens 4'' x 1'' x 3½'', fastened with screws. The sections are painted light blue and marked out into 1-inch squares with waterproof ink.

Land features are cut from half-inch pine and fastened to the top of the board by means of small screws. Small models are used to represent batteries and other land defense features, such as position finding stations, towers, searchlights, etc., while roads, streams, woods, etc., are painted in their natural colors.

Searchlight beams are made of stiff drawing paper, painted blue on one side and pivoted at positions of the searchlights. These "beams" represent the actual range of lights, and are designed to be operated as searchlights. When in action, the light side is turned up; when out, the blue side.

The limits of the field of fire of the batteries are outlined by means of thread stretched on the board and fastened with thumb tacks.

Measuring tapes, graduated to each 1,000 yards, for obtaining the approximate ranges, are pivoted at the positions of the various batteries.

Models of lighthouses, buoys, and datum points are set in their proper places on the board.

A uniform background is provided by light boards, 10'' x $\frac{1}{4}$ '' x 4', with bracket supports to keep the boards upright. These boards are painted black on one side for use in night phases, and so as to represent a cloudy sky on the other side, for use in day phases.

The sections of the maneuver board are laid upon pine trestles. Each trestle is 12' long, $2\frac{1}{2}$ ' wide, and $2\frac{1}{2}$ ' high. The legs are held rigid by means of side braces of 1-inch stuff 4'' wide screwed to the legs. End braces of the same material are bolted to the end legs, so that the trestles can be taken apart and piled compactly.

The trestles for the Artillery School board are fastened together in four groups. The end braces are long enough to include all the trestles in the group. This makes the supports more rigid. There are ten of these 12-foot trestles, each providing two supports for the table.

Ship models.—The ship models are made on a scale of 1'' = 100 feet. They are constructed of wood and executed in sufficient detail to make distinguishable the general characteristics of the vessels of which they are the models.

Viewed from the point of those playing the game, their appearance is that of the vessel seen with good glasses at about mid range.

The war vessel models are painted war color. The water line at the bow is outlined by a narrow white line, representing the bone, which assists the players in determining the direction in which the ship is moving.

Battle flags are provided, mounted on small pins, which are attached to the models when under fire. They are designed to indicate to the players the ships under fire.

For training the players for routine artillery drill, models of the various commercial craft are used. These models are painted like the vessels they represent.

The warship models are made as follows:

With the use of tracing paper the outline of the water-line section of the ship is made (scale, $1'' = 100$ feet). A thin piece of board, the thickness of the water-line section, uniform in size, is selected, and the outline of the section transferred to it. This outline is then cut out and the foundation of the vessel beginning at the water line is laid. By use of other thin pieces of board the model is built up in a similar way until the hull is completed.

The stacks are made of wood, holes being bored for same in the hull and the stacks glued in.

The turrets are cut out the proper size and glued to the hull. Pins are driven into the turrets and along the hull where required, to represent guns.

The masts are made of wire, or in the case of basket masts, of wire mesh, with cork cylinders glued at the proper place to represent fighting tops.

Range tapes.—Each battery is provided with a range tape, by means of which the approximate range of a target from that battery can be quickly determined. The range tapes are strips of tracing linen, $\frac{1}{2}''$ wide, graduated in thousands of yards to the scale of the board, $1'' = 100$ yards.

One end of the tape is pivoted, by means of a thumb tack, on that portion of the board representing water as near the battery as possible. The zero of the graduations is under the thumb tack and each thousand yards is numbered in ink from the pivot out to the extreme range at which the battery can fire.

When a target is assigned to a battery the range tape of that battery is extended to the target and the range indicated to the range-board operator. The range to the target is thereafter measured for each move.

Clocks.—The clocks are pasteboard dials, numbered like the dial on an ordinary clock, supported by a wooden frame and provided with an index.

At the beginning of the first move, when the curtain is drawn aside, the dials of all the clocks are turned so as to indicate 12. Thereafter, as the curtain is drawn in front of the playing board, the dial of master clock (i. e., one operated by the board operator) is advanced one number.

The battery clocks are all set at 12 at the beginning of the game. When a battery is assigned to a target its clock is set by the battery commander to the move at which it can have completed one minute's

firing. Thus, if during move 3 a 12'' gun battery is assigned a target, the battery clock is set at the reading of the master clock plus 3, or at 6. When the curtain is drawn in front of the board and the master clock has been advanced to 6, the number of hits obtained during a minute, as determined from the hit bag, is recorded on the hit board.

Range board.—The range board is simply a blackboard ruled with chalk as indicated below.

The board is placed so as to be visible to all artillery commanders. The range of a target assigned to a battery is checked off by the range board operator in the proper column opposite the name of the battery at the end of each move of the ships.

Ranges to the nearest thousand yards.

Battery.	16	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Montgomery.....															
De Russey.....															
Parrott.....															
Etc.....															

Hit board.—The hit board also consists of a blackboard ruled in chalk as shown below. This board is placed so as to be visible only to the umpire and the naval commanders.

The first four columns are filled out before the game begins. When a target is assigned to a battery, an abbreviated description is entered by the hit board recorder in the fifth column with the number of the move. The water areas into which the field of fire is divided are given numbers for simplicity in recording. Thus, if a target assigned were "Lynnhaven, Battleship Division, Line Ahead, Ship No. 1," it would be recorded in the fifth column as shown below. If this target is changed, a vertical line is drawn to the right of the description, the number of the move is indicated, and the description of the new target is entered.

In the last column the hits are recorded by short vertical lines. If the target is changed, the time of the change is indicated by a subfigure as shown and a vertical line drawn.

The umpire is thus informed of the number of hits received by each ship and assesses damages accordingly.

Battery.	Caliber.	Commander.	Fire commander.	Target.	Hits.
Parrott.....	2-12''	Turtle.....	1st Storek.....	2(2) B. S. L. Ah. 1g.....	111g

Each battery commander is provided with a flag, consisting of a piece of red cloth, 3'' x 6'', attached to a piece of heavy wire, the latter being shaped so as to form a base on which it will stand upright. When the battery is firing, the flag is placed in the upright

position, thus enabling the hit board recorder to determine without conversation which batteries are firing. When the battery is not firing, the flag is laid on the table in front of the battery commander.

III. METHODS OF SCORING GUN FIRE.

Shore batteries against ships.—The rates of sustained fire for the different types of armament in the fixed defenses are taken as follows:

Mortars: A pit salvo every 2 minutes.

Primary guns: 1 round per minute.

Intermediate: 4 rounds per minute.

Secondary: 8 rounds per minute.

To allow for the time required for getting observations, etc., on the target, checking the tracking, and adjusting the data, mortars commence firing on the fourth move after assignment to target, and guns of the primary armament on the third. The intermediate armament fires only two rounds on the first move following assignment to a target and the secondary armament only four rounds. For subsequent moves they fire in accordance with their rates of sustained fire as given above.

Hits are scored by drawing from a hit bag, especially prepared for each class of armament. The hit bag is a simple bag of cloth, white for day firing, and black for night, measuring about 4" x 8", each bag containing 100 half-inch cubes of wood marked as indicated in the table. For mortars a single cube is drawn for each pit salvo, and for guns a cube is drawn for each shot. The numbers marked on each cube indicate thousands of yards of range, and to score a hit it is necessary to draw a number equal to or greater than the range to the target (which is posted for the battery on the range board).

The percentages of hits to be expected at the different ranges are based upon results obtained at target practice with the seacoast armament.

Probability of hitting.

ONE HIT IN PIT SALVO—12-INCH B. L. MORTAR vs. U. S. S. "DELAWARE."

Marks on cubes.	Day firing.		Night firing.	
	Per cent hits.	No. cubes.	Per cent hits.	No. cubes.
3	66.6	4	38.5	8
4	62.7	6	31.3	5
5	57.2	6	25.5	5
6	51.2	5	20.9	4
7	45.6	6	17.2	3
8	40.3	5	14.2	14
9	35.5	4		
10	30.9	4		
11	26.8	4		
12	23.2	3		
13	20.2	3		
14	17.3	2		
15	15.0	15		
Blanks		33		61
Total		100		100

Probability of hitting—Continued.

PRIMARY ARMAMENT vs. U. S. S. "DELAWARE."

Marks on cubes.	Day firing.		Night firing.	
	Per cent hits.	No. cubes.	Per cent hits.	No. cubes.
2	90	3	71	21
3	87	18	50	16
4	69	16	34	19
5	53	13	24	8
6	40	9	16	4
7	31	6	12	3
8	25	5	9	9
9	20	4		
10	16	3		
11	13	3		
12	10	2		
13	8	1		
14	7	1		
15	6	6		
Blanks		10		29
Total		100		100

INTERMEDIATE ARMAMENT vs. DESTROYER.

1	90	22	90	43
2	68	30	47	26
3	38	14	21	10
4	24	10	11	5
5	14	5	6	3
6	9	3	3	1
7	6	2	2	1
8	4	1	1	1
9	3	1		
10	2	2		
Blanks		10		10
Total		100		100

SECONDARY ARMAMENT vs. TORPEDO BOAT.

1	90	30	90	48
2	60	29	42	24
3	31	15	18	10
4	16	8	8	4
5	8	4	4	2
6	4	1	2	1
7	3	3	1	1
Blanks		10		10
Total		100		100

Ships on shore batteries.—The effect of the fire of hostile ships against the shore defenses is determined by means of tables, showing the life in units of the elements comprising the shore defenses and the rate at which units are scored by the ships at various ranges.

These tables are prepared for the coast defense command and each class of warship employed in the game, as follows:

Divide the shore defenses into areas not exceeding 200 yards square, number the areas from right to left along the water front, and in each area list the elements of the defense which are exposed to damage by ships' fire. The number of units required to score a hit in any area is determined by dividing 2,500 by the number of elements in that

area, each power plant, searchlight, fire-control station, gun, etc., counting as an element.

A hit having been scored in an area, it is localized by the throw of a die, as indicated in the table on the following page.

In the case considered the number of elements in an area exceeds six, and it is necessary to have the first dice thrown represent more than one element, and to employ a second throw to distinguish between the elements represented by the first dice thrown. Where a fall is not used in the table, as the "six" in the fourth column in this case, it is ignored, and if it appears the throw is repeated.

Effect of ship's fire on shore defenses.

Area No.	Units required to score a hit.	Elements.	Dice throws.	
			First throw.	Second throw.
11	250	Light No. 6.....	Ace.....	Ace, deuce, tray.
		Light No. 7.....	Ace.....	Four, five, six.
		B' Smith.....	Deuce.....	Ace, deuce, tray.
		B' Black.....	Deuce.....	Four, five, six.
		B' Ward.....	Tray.....	Ace, deuce, tray.
		B' Green.....	Tray.....	Four, five, six.
		B. C. Smith.....	Four.....	Ace, deuce, tray.
		No. 1, Smith.....	Four.....	Four, five, six.
		No. 2, Smith.....	Five.....	Ace, deuce, tray.
		F1'.....	Five.....	Four, five, six.

The tables for determining the units scored by the ships when firing against the shore defenses are prepared from the following data:

Units scored per gun per minute for ship's guns firing against coast defenses.

Range (yards).	Primary.	Inter-mediate.	Secondary.
1,000	100	130	80
2,000	85	110	70
3,000	60	80	50
4,000	30	40	25
5,000	20	25	10
6,000	15	15	6
7,000	10	7	3
8,000	8	4	2
9,000	6	2	1
10,000	4	1	
11,000	3	1	
12,000	2		
13,000	1		
14,000	1		
15,000	0.5		

This table is based upon all available data regarding the accuracy and effect of naval fire, the number of units assigned the above areas, and the following rates of sustained fire:

Primary gun.—One round per minute.

Intermediate gun.—Four rounds per minute.

Secondary gun.—Eight rounds per minute.

The table of units scored by ships is prepared as follows:

Determine the number of guns for each type of ship that can fire ahead and on one broadside, for each class considered, and take the mean of these as the effective armament.

Multiply the units for each type at each range, as given by the table, by the number of guns in each type, and add the results. These sums will be the units scored by the ship at the indicated ranges. For example, take the British battleship *Canopus*:

Armament.

Ahead, 2-12'', 4-6'', 2-3''.

Broadside, 4-12'', 6-6'', 5-3''.

Primary gun: $\frac{2+4}{2}=3$.

Intermediate gun: $\frac{4+6}{2}=5$.

Secondary gun: $\frac{2+5}{2}=3.5$.

Range, yards.		Units.
1,000	$3 \times 100 + 5 \times 130 + 3.5 \times 80$	=1,230.
10,000	$3 \times 4 + 5 \times 1$	=17.
12,000	3×2	=6.

These results for type of ships are tabulated as follows:

Units scored per minute by ships firing against coast defenses.

		Ships, class, and type.					
		Utah (dread- nought).	Kansas (pre- dread- nought).	North Carolina (armored cruiser).	Brooklyn (light cruiser).	Washington (gunboat).	Fanning (destroyer).
Effective	arma- ment.	Seven 12- inch, six 5-inch.	Three 12- inch, four 8-inch, four 7-inch, eight 3- inch.	Three 10- inch, six 6-inch, seven 3- inch.	Six 8-inch, five 5-inch, four 6- pounders.	Three 4-inch.	Three 4-inch.
		Units scored per minute.					
Range:		1,500	1,860	1,650	1,550	240	240
1,000 yards...	1,500	1,250	1,600	1,400	1,350	210	210
2,000 yards...	900	450	570	500	480	150	150
3,000 yards...	450	290	320	280	280	75	75
4,000 yards...	190	110	210	180	190	30	30
5,000 yards...	110	80	120	95	110	20	20
6,000 yards...	80	55	60	40	50	9	9
7,000 yards...	55	35	30	20	30	6	6
8,000 yards...	25	14	25	15	20	3	3
9,000 yards...	14	7	14	6	12		
10,000 yards...	7	7	7	3	6		
11,000 yards...	7	7	7	3	6		
12,000 yards...	4	4	4	2	3		
13,000 yards...							
14,000 yards...							
15,000 yards...							

IV. ASSIGNMENT OF PLAYERS.

To obtain the most satisfactory results, players should be assigned as follows:

Each battle command.....	1
Each fire command.....	1
Each mine command.....	1
Each battery.....	1
In charge of ships.....	1
Range board.....	1
Hit board.....	1
Director.....	1
Umpire "ashore".....	1
Umpire "afloat".....	1

If landings are made, players are assigned as commanders and umpires in accordance with the principles employed in map maneuvers.

Where a fewer number of players than those indicated above are available, it is best to require fire and mine commanders to operate the batteries in their commands, before disturbing any of the other assignments.

V. THE MOVES.

Each complete move represents one minute of time, though in practice several minutes are usually consumed, on account of the impracticability of having more than one player speaking at the same time. A complete move consists of operations on both sides, the naval players being out of the room while the land players are giving their commands, and a curtain being drawn across the room, concealing the board from the land players, while the naval players are making their moves.

The naval commander gives his instructions to his subordinates while outside the room between moves so as to make any conversation among the naval players unnecessary while in the room.

In starting the game, the curtain is drawn across the room and the naval commander supervises the placing of his ships, subject to such restrictions as the umpire may impose, usually just beyond the extreme range of the most powerful guns ashore or afloat, and in such a formation as he may deem best suited to the nature of the attack to be made, keeping in mind the restrictions imposed by the hydrographic conditions.

The chief umpire then causes a bell to be rung, the naval players withdraw from the room, and the curtain is withdrawn, disclosing the board to the land players. The battle commander gives his orders to his fire or mine commanders as to assignment of targets, opening of fire, etc. He may obtain from the umpire on request any information which he could obtain from the battle commander's station, such as the appearance of the hostile ships, their speed, their

targets in case they are firing, and their approximate range. Any fire, mine, or battery commander may obtain similar information from the umpire by request at the proper time. When all commands have been given, the umpire causes the bell to be rung again, the curtain is drawn, and the naval players reenter and move their ships, the distance they are moved being the distance to the scale of 100 yards to the inch they would pass over in one minute at the assumed speed. The naval commander informs the umpire of the speed of his ships, the targets at which they are firing, and the number of guns of various calibers at any given time.

The subsequent moves are made in a similar manner, except that on the land side, whenever any fire or mine command or battery has been given independent action, the fire, mine, or battery commander concerned must be given an opportunity at each move for giving further commands to his fire or mine command or battery. Such opportunity should be given after the battle commander has given his orders.

The precedence in giving orders is as follows: First, battle commander. Second, fire commander, first fire command. Third, battery commanders, first fire command. Fourth, fire commander, second fire command. Fifth, battery commanders, second fire command. Sixth, mine commander, etc.

A flag is provided for each battery consisting of a pin to which a piece of colored paper marked with the name of the battery is attached. For guns of the primary armament these are red; for mortars, yellow; and for intermediate and secondary guns, green. As soon as a battery opens fire its flag is placed on the ship model by the umpire, so that it is possible to tell at a glance on what target any particular battery is firing. Upon opening fire, battery commanders raise the small red flags, heretofore described, on the table in front of them.

When a target is assigned to a mortar battery, its clock is set forward four minutes and left there until the master clock, operated by the umpire's assistant, catches up to it, when the simulated firing is begun. The interval for guns of the primary armament is three minutes, and for intermediate and secondary guns, the firing is begun on the next move as described under "Hit bags."

VI. THE NIGHT GAME.

Night attack is simulated by having the room artificially darkened. The lowering of window curtains has been found to be insufficient, and, at the Coast Artillery School, all the windows of the room used for the game are provided with heavy paper tacked to the sash of the windows and doors, so that there is very little light in the room when everything is closed. In fact, it is usually necessary to have one window opened slightly, so that the darkness may not be too great.

The shore searchlights are indicated as heretofore described. When the blue side is turned up, the light is assumed to be out, and when the light is ordered in action, the white side is turned up. The beams are operated by the umpire according to the commands given by the battle commander or a subordinate to whom he has assigned the light. Ships are represented by black pins which can not be seen from the station of the land players. When a beam in action encounters one of the pins, the umpire announces the craft, replacing the pin by ship model, and giving such information concerning the ship as would probably be evident at the range. In case the light is ordered to "Follow," the model is left on the board, usually with a piece of white paper behind it to give a better silhouette, but if the beam is taken off the model, the ship is again replaced by a pin.

For 60-inch searchlights, the beams are 9,000 yards long, gradually divergent from the shore to about 7,000 yards range, where they are about 400 yards wide, and then tapering to a point at about 9,000 yards. The beam for 36-inch light is of similar shape and about 4,000 yards long.

VII. METHODS OF UMPIRING.

The umpires for the Coast Artillery War Game consist of a chief umpire, an artillery defense umpire "afloat," and a land defense umpire "ashore."

Chief umpire.—The chief umpire causes the board to be prepared, locates the batteries, searchlights, etc. He supervises the preparation of the problems and the carrying on of the events between phases. (A phase is an interval during a situation when the players are actually at the board and conduct their operations thereon.) Between phases the situation is developed by the umpires and the players as follows: Certain conditions are stated by the umpires, whereupon the players are required to take some appropriate action, or the players may make claims as to dispositions or acts on their part, whereupon the umpires render decision as to the result thereof.

For example: The chief umpire may submit the following in writing to the mine commander: "Time, 4 p. m. It is raining and one can see 2,000 yards with difficulty. You can just make out three small craft maneuvering in the inner mine fields, and at the same time you get a message from the casemate that mines Nos. 7 and 8, group No. 4, have suddenly begun to test very badly. What action do you take?" The mine commander is then required to decide at once upon his action and submit an outline of the same in writing. The chief umpire then makes decision as to the result and notifies the mine commander and the fleet commander thereof in such terms as to convey the information which he considers each entitled to. Thus, under the supervision of the chief umpire, the situation is developed between phases until an engagement is

brought about, when the players go to the board and carry on the situation there.

The chief umpire makes all assignments of players, as well as assistants, such as range board operator, hit board operator, writer of war diary, etc. He supervises the game, maintains discipline and system among the players, and constantly plans for improvement in the material and methods of playing the game. An evidence of the effect of such work on the part of the chief umpire was noted during the past year where a section of players drilled and instructed for some time were able to carry on the operations of the game quietly and systematically, but when replaced by an entirely new section, without any previous training in giving commands and in the methods of operation of the game, it was practically impossible to accomplish proper results.

The chief umpire decides when the different phases begin and end, as well as the commencement and ending of each move. He gives the signal for the curtains concealing the board from the players to be drawn aside. He sees that all players use the prescribed forms of commands, and corrects errors in this respect as they occur. If he discovers that the fleet commander or his assistants are making dispositions afloat which are not conducive to the best results from the standpoint of instruction, he causes such changes therein as he deems best. Upon the completion of a phase, the chief umpire, assisted by the other umpires, assesses damages afloat and ashore and decides what the resulting conditions are. These decisions are based on the number of hits made, as shown by the hit board, modified by weather conditions, time of day or night, condition of searchlights and fire-control equipment, and the nature, size, shape, protection, and presentment of the targets. The decisions are written out, a copy being furnished to those concerned and one filed with the officer detailed to keep the war diary.

The artillery-defense umpire.—The artillery-defense umpire acts as an assistant to the chief umpire over the water areas only. He decides whether or not the targets assigned are within the arcs of fire of the batteries. He measures the range of each target from the battery assigned to it after each move and signals the same to the range-board recorder. As soon as a battery opens fire on a target he places thereon the small flag heretofore described. During the night phases he handles the paper strips indicating searchlight beams in accordance with the orders of the player controlling the light. When a player orders "No. 6, in action," he picks up the sea end of the beam marked "No. 6" and turns it over with the white side up. The player may then direct "Cover No. 5," whereupon the artillery-defense umpire moves the beam to the right or left until it touches the beam of No. 5. The player may then direct "Search left," whereupon the umpire carries the beam in the direction indicated and

informs the player verbally whether or not the beam illuminates a target. For instance, in case the beam encounters a pin representing a ship, the umpire may say, "You can see a small ship in the beam." The player directs, "Search left." The umpire moves the beam slightly to the left, where it encounters a second pin, whereupon he states, "You see another ship." The player directs, "Follow," whereupon the pin is replaced by the ship's model, as heretofore explained. The umpire gives the players directing the light only such information as the latter are, in the opinion of the former, entitled to under the previously stated conditions of weather, etc. This is the guiding spirit of the artillery-defense umpire. He bears in mind the conditions, decides just what a combatant ashore or afloat would be able to see, hear, or otherwise learn of the enemy, and gives out that information. In this connection, the umpire is subject to pertinent questioning by the players, which questions he answers as he sees fit, bearing in mind the conditions, and giving then only such information as they would probably be able to get in actual service. In case certain ships are not covered by searchlight beams, the umpire gives such information as the following when it is proper to do so: "You can hear heavy firing off to the northwest and shells are falling in the vicinity of searchlight No. 6," or "Light and intermittent firing is taking place off Buckroe—firing of small arms."

The artillery-defense umpire is provided with a chart on which is represented the exact location of the mine fields. He notes, during each phase, whether or not any ships pass over these mines and turns such ships out of line or sinks them as he thinks best under the conditions. If at the end of a phase it is seen that a ship or a division of ships is headed toward the mine fields, the umpire requires the commander of the ship or division to lay a string on the board indicating the exact course which the player expects or had expected to follow. The player then withdraws and the chart is consulted, and if the mine fields are passed over by the indicated course, damages are assessed accordingly.

In short, the artillery-defense umpire handles operations as nearly as possible in conformity with actual conditions and decides all points between players operating over the water areas.

Land-defense umpire.—The land-defense umpire supervises the landing operations and the activities of the Coast Artillery supports.

The Coast Artillery support commander is provided with a map on which he shows his forces, using Kriegspiel models. The commander of the landing party is required to show his dispositions with Kriegspiel models on the board. The land-defense umpire then supervises the conduct of the land attack in exactly the same way that a map maneuver is operated in the land-defense course. At the conclusion of a phase he assists the chief umpire in assessing damages and determining resulting conditions. He decides all points arising

between players during a phase, gives ranges to the commanders of batteries used against land forces, as accurately as, in his judgment, the means provided for determining these ranges justify, and imparts to the players all information necessary in the development of a phase.

While the duties of the land-defense umpire are very similar to those of an umpire of a map maneuver for mobile forces, still he must have a general knowledge of coast artillery as well as mobile army warfare; and he must at all times have information as to the situation afloat and must keep the land operations synchronized with the operations afloat.

VIII. THE WAR GAME.

The actual playing of the War Game on the board is preceded by a careful course of instruction in the identification of the various classes of vessels and the indication of the same as targets, including the giving of proper commands.

Pictures of these various classes of vessels are thrown on the screen of a balopticon. A picture is displayed for 30 seconds, after which each member of the class is required to make a rough sketch of the same, showing the characteristic features thereof and stating the class to which she belongs. These pictures include the various classes of sailing vessels, commercial vessels entering and leaving the harbor, and war vessels of various nationalities.

After a few days of this work the sketching is discontinued and members of the class, when a picture is thrown on the screen, are required to indicate the vessel as a target, giving a proper description and using proper commands.

This course is followed by a similar course at the board, using the ship models placed in various formations (single ships, line ahead, line abreast, double column, etc.).

In this way the members of the class are well grounded in the proper methods of identification and indication of targets before any attempt is made to commence the actual playing of the War Game.

During the school year 1911-12 the game was played, using three fortified harbors as theaters of operations—the entrance to Manila Bay, the Pacific entrance to the Panama Canal, and Fort Monroe, Va. As a result many interesting situations developed and those officers who participated in the game acquired many items of general as well as specific knowledge concerning the localities mentioned.

Problems to be worked out on the board are prepared in the same way as those for field exercises of the mobile army. They consist of a general situation, which is given to both sides, and special situations for each side. The general situation contains only information to which both are entitled, such as that the Red fleet has command of the sea, any information concerning this fleet which would

be a matter of common knowledge, as well as any information concerning the fortifications and Blue forces as might properly be in possession of the Reds. The special situations contain information which is known to one side only. Thus the general situation, together with his special situation, gives the commander of one side such information as he requires in estimating the situation and determining his mission. For each phase of the game the time of day, state of the weather, tide, etc., are announced by the chief umpire. After the general and special situations are given out and before the playing of the game is commenced as many of the following special requirements as are applicable are assigned to the players, reports being required in each case:

1. The defense commander's estimate of the situation and his orders.
 2. Number of shell that can be filled and fused after the first information is received that would warrant this action being taken and before the earliest date on which an attack may be expected.
 3. Location of all fire-control stations, searchlights, etc.
 4. Division of the armament into fire and battle commands.
 5. Complete manning party for the fortifications.
 6. Estimate of amount and kinds of ammunition on hand for each battery, source of further supply and when it may be expected to arrive.
 7. Location of naval patrol, harbor-entrance patrol, etc., by day and by night, and methods of identification by night.
 8. Should the entrance be mined? If so, location of casemate, mine fields, and mine base lines.
 9. Estimate of time for fleet to reach anchorage in the vicinity of the fortifications from its last reported location.
 10. Amount of coal required by the fleet.
 11. Estimate of situation afloat, names and classes of ships to compose the fleet, and plans of attack of each subdivision thereof.
- A war diary of each game played is also required to be kept.

IX. GENERAL INFORMATION.

Sustained speed of vessels other than torpedo craft.—A vessel may maintain maximum speed for 12 hours.

A vessel may maintain 2 knots less than maximum speed until coal is exhausted or until the umpire declares a breakdown.

Maximum formation speed is 2 knots less than maximum speed of slowest vessel.

The above rules are for fair weather and clean bottoms. The umpire will decide on reductions of speed to fit other conditions.

Sustained speed of destroyers.—A destroyer may maintain maximum speed for four hours; it must then slow to 5 knots less than maximum speed for six hours.

A destroyer may maintain 5 knots less than maximum speed until coal is exhausted or until umpire declares a breakdown.

Maximum formation speed for destroyers is 2 knots less than maximum speed of slowest vessel.

Sustained speed for torpedo boats.—A torpedo boat may maintain maximum speed for two hours; it must then slow to 5 knots less than maximum speed for three hours.

A torpedo boat may maintain 5 knots less than maximum speed until coal is exhausted or until the umpire declares a breakdown.

Daily coal expenditure for various types of ships, June, 1912.

Speed per hour.	Per cent of bunker capacity.												
	Dreadnought (A.A.).	Battleship, 1st class (A.).	Battleship, 2d class (N.).	Battle cruisers (B.B.). ¹	Armored cruisers (B.).	Monitors (M.).	Cruisers, 1st class (C.).	Cruisers, 2d class (F.).	Naval scouts (S.).	Destroyers (over 700 tons) (V.V.).	Destroyers (less than 700 tons) (V.).	Torpedo boats (T.).	Merchant scouts (E.).
10 knots.....	3	4	5	3	4	10	5	5	5	10	11	10	2.7
12 knots.....	3	4	7	4	6	13	6	7	7	11	13	15	2.7
14 knots.....	5	6	11	6	8	.....	8	10	9	12	17	22	.....
15 knots.....	5	7	13	7	10	.....	10	12	10	14	20	27	3.4
16 knots.....	6	8	15	8	11	.....	12	13	11	14	23	32	.....
17 knots.....	7	10	.....	9	13	.....	14	15	12	16	27	39	5
18 knots.....	8	13	.....	10	15	.....	17	17	14	18	31	48	.....
19 knots.....	10	.....	.....	11	18	.....	22	19	15	20	37	58	.....
20 knots.....	12	.....	.....	12	23	.....	30	21	18	22	43	70	8.5
21 knots.....	15	.....	.....	13	30	.....	.....	.....	20	25	51	82	.....
22 knots.....	.....	.....	.....	14	31	.....	.....	.....	23	29	60	94	.....
23 knots.....	.....	.....	.....	16	.....	.....	.....	.....	27	33	69	107	.....
24 knots.....	.....	.....	.....	17	.....	.....	.....	.....	31	37	80	126	.....
25 knots.....	.....	.....	.....	18	.....	.....	.....	.....	.....	42	93	135	.....
26 knots.....	.....	.....	.....	19	.....	.....	.....	.....	.....	47	108	151	.....
27 knots.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53	126	167	.....
28 knots.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	148	183	.....
29 knots.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	68	.....	201	.....
30 knots.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	76	.....	.....	.....

¹ Estimated.

ESTIMATES FOR FUEL SUPPLY TO FLEET.

The rate of consumption of coal by the fleet and train for 10 knots' speed based upon average conditions of hull and machinery and average steaming efficiency:

Battleships	} $\frac{4}{9}$ of a ton per mile per ship.
Armored cruisers	
Cruisers, first class	
Naval scouts	
Cruisers, second class	} $\frac{1}{6}$ of a ton per mile per ship.
Gunboats	
Merchant scouts	
Auxiliaries	
Transports	} $\frac{1}{10}$ of a ton per mile per ship.
Destroyers,	

The daily fuel consumption in port is equivalent to the amount consumed in steaming 70 miles at sea at 10 knots speed.

One ton oil fuel is equivalent to 1.4 tons coal.

RULES FOR NAVAL MINES AND MINE LAYERS.

A ship struck by a mine will be given an even chance to sink or float: If afloat she will be considered as having lost one-half of her flotation. Her remaining effective gunfire will be given one-half chance of ceasing or continuing. Her speed will be reduced in accordance with fall of the die.

Mine layers will be assumed to carry 300 mines, 150 on deck and 150 in the hold, and to have capacity for carrying all on deck, and to be able to lay them at a rate of one every five seconds. The spacing of mines will ordinarily be assumed to be 50 yards unless elected to the contrary, and the danger space of the mine 10 feet. The depth of the water may not exceed 200 feet for controlled mines and 100 feet for contact mines. The strength of the current shall not exceed 2 knots when the mine may be laid, except in the case of ground or dormant mines. The depth of water for ground or dormant mines shall not exceed 35 feet.

The speed of the mine layer may not exceed 19 knots, and her life shall be the life of that type of ship used for the purpose, less 10 per cent penalty imposed on that life on account of duty upon which she is employed.

Torpedo craft.—Torpedo craft may be used as mine-laying vessels as follows:

(1) The time for laying each mine shall be 10 seconds and the number of mines carried twelve.

(2) Floating mines may be towed by torpedo craft, but the number towed shall not exceed three, and the speed of the towing vessel shall not exceed 12 knots.

(3) Dummy mines and objects to resemble the periscope of a submarine may be towed, floated, or planted.

Submarines.—Mines may be towed by submarines awash and in submerged condition with periscope up, but the number shall not exceed three.

Other vessels.—Scouts, cruisers, mine layers, converted merchant ships, and destroyers may perform the same functions as mine layers, as regards mines, dummy mines, etc., and the condition will be the same as laid down for torpedo craft.

DRAGGING.

The time for clearing a field by dragging shall be the time taken for a ship fitted for dragging to cover that particular portion designed to be cleared at a speed of 6 knots. When a field has been supposed

to be cleared of mines by dragging, it will be assumed as an even chance that one-fifth of the mines have not been entirely cleared away. Submarines, in addition to their regular use, may be allowed to work subsurface in creeping for the cables of controlled mines. The time taken to perform this work will be the multiple of the time taken to lay that particular field, as shown by the dice. Any submarine will stand an even chance of entirely clearing the area she is working upon.

Owing to the dangers involved in creeping and working on a field of mines, the danger of detection and destruction by surface craft while operating in this way below surface, the submarine will be assumed to stand an even chance of destruction while engaged in this work.

Fish nets and booms may be used to protect a mine field and the chances will be assumed as even as to whether they protect or not.

CHAPTER III.

THE FALL OF DURAZZO.

A maritime nation, after mature investigation, selects certain points of its coast line as being essential to its continued existence as a sovereign State. The places selected are usually those of great commercial or military importance, and vast sums of money are expended in providing what is considered by competent military authorities an adequate defense both on the land and sea fronts. Fortifications are constructed, guns mounted, submarine mines planted, and all of the adjuncts of the defense are carefully planned and installed. A large portion of the available armed forces of the nation are employed to keep these defenses in a proper state of efficiency, to be ready for action at or before the outbreak of war.

Although history is full of examples where fleets have found it essential to the successful prosecution of war to attack fortifications, the doctrine of naval warfare as it is expounded to-day by its ablest masters refuses to consider any serious attack on them except such as can be made on the landward side.

The general acceptance of this doctrine has not failed to have a most deleterious effect upon the efficiency of any fortified port. Combinations of guns and mines do not *per se* make an efficient defense, a result only to be attained by assiduous training on the part of those in command. Some ten years ago, upon the instigation of the Chief of Artillery, and with the hearty cooperation of the Navy, much was accomplished in the training of the coast artillerist to perform efficiently his wartime functions in repelling various forms of naval attack. In later years this beneficial cooperative training has been abandoned. The proper handling of the elements of a coast defense command can not fail to be a most complicated problem, involving not only rare coolness and unerring judgment on the part of the various commanders, but frequent rehearsals of the constituent phases of the general attack. In many ways the seaward defense of a coast defense command is unique, when considered in the light of battle. It is the only occasion in warlike operations where the "*mise en scene*" is definitely fixed before the first hostile shot is fired; the only occasion where the avenues of approach are rigidly fixed; where the strength and resources of one side can not be reinforced during the progress of the engagement; and where the various phases of possible attack and defense can be fully planned and minutely rehearsed. Failing in such training, the inherent power of the shore defenses must

unavoidably be lost in the resulting confusion of the relatively short action.

With a view to investigating the various stages of an attack from its inception until finally carried to its ultimate conclusion, to stimulate and encourage thought and investigation along the lines of the best means of defense, and to assist those charged with the preparation of general-defense plans in the proper performance of this important duty, the following problem has been formulated:

PROBLEM.

Each member of the regular class will submit a solution of this problem by 11.30 a. m. to-day. No books of reference will be consulted.

A state of war exists between Blue and Black, the latter having command of the sea. Admiral Brin, with a Black fleet is approaching Durazzo, with orders to occupy the same. Durazzo, 4,000 miles from Admiral Brin's base, is that port whose occupation by Black within 30 days is essential to the successful prosecution of the war. It is situated on an island as shown on the accompanying chart, and located near Roncador Cay, 350 miles due north of the Atlantic entrance to the Panama Canal.

Durazzo is a city of size, importance and resources (naval and military) similar to Norfolk, and is capable of drawing its food for three months from the supply on hand. It contains a naval dock yard of the first class. The fortifications, so far as Admiral Brin's information goes, are shown on the accompanying chart. They are manned by the regular garrison, presumably of normal strength, supported by the local militia organizations. No reliable information is available as to their efficiency or as to the amount of ammunition available.

The approaching Black fleet is composed of 13 battleships, 8 armored cruisers, 6 cruisers, 1 protected cruiser, 21 destroyers, 10 submarines, 10 colliers, 2 repair ships, 1 mine layer, 2 hospital ships, 3 supply ships.

Required.—The organization of the Black fleet.

(Names of any actual battleships, armored cruisers, cruisers, destroyers, etc., may be taken.)

Admiral Brin's estimate of the situation arranged as follows:

- (a) His mission.
- (b) Enemy forces—strength, disposition.
- (c) Black forces—strength, disposition, courses of action open.
- (d) Decision as given by a summary of Admiral Brin's proposed line of action.

ADMIRAL BRIN'S ESTIMATE OF THE SITUATION.

Mission.—Admiral Brin's *mission* is to occupy this port within 30 days. Hence no amount of destruction by bombardment alone can fairly be assumed to accomplish his mission, so long as sufficient armament is left intact to deter the Black fleet from entering the port. The importance of Durazzo is such as to warrant the greatest vigilance on the part of its defenders, and the Black fleet can scarcely hope to take the defenses by surprise.

Enemy forces.—Admiral Brin's *information as to the defenses* is limited to such as has been collected by the Black general staff in time of peace, and naturally is deficient in many respects, hence his initial movements must be characterized by caution. He must endeavor by every possible means to amplify this knowledge. He has no definite information as to whether or not Durazzo shelters any hostile warships, but being a naval port of the first class the presumption is that it does. As the appearance of hostile ships would seriously interfere with his plans, he must take the necessary precautions to make himself secure from such attempts. In the absence of specific information to the contrary he is warranted in assuming that no large body of mobile troops is to be encountered.

Black forces.—With such a large fleet, the questions of security, supply, and repair are of paramount importance. He will therefore be greatly concerned in selecting a secure, convenient, and commodious advanced base, from which his operations may be conducted. It may be presumed that his fleet is organized tactically in a proper manner, but for clearness this organization will be given below.

Black fleet—Admiral Brin commanding.

Independent flagship of fleet, *Arkansas*.

Despatch boat—Destroyer *Balch*.

FIRST DIVISION.

Admiral A commanding.

Utah, flag.
Florida.

Delaware.
North Dakota.

SECOND DIVISION.

Admiral C commanding.

Michigan, flag.
South Carolina.

Connecticut.
Louisiana.

THIRD DIVISION.

Admiral D commanding.

<i>Vermont</i> , flag.	<i>Kansas</i> .
<i>New Hampshire</i> .	<i>Minnesota</i> .

FOURTH DIVISION.

Admiral E commanding.

<i>Washington</i> , flag.	<i>Tennessee</i> .
<i>Montana</i> .	<i>North Carolina</i> .

FIFTH DIVISION.

Admiral F commanding.

<i>California</i> , flag.	<i>Colorado</i> .
<i>West Virginia</i> .	<i>Pennsylvania</i> .

SIXTH DIVISION.

Admiral G commanding.

<i>Salem</i> , flag.	<i>Birmingham</i> .
<i>Chester</i> .	

SEVENTH DIVISION.

Admiral H commanding.

<i>St. Louis</i> , flag.	<i>Milwaukee</i> .
<i>Charleston</i> .	

DESTROYERS—GROUPS.

Group 1—Commander X—*Fanning*—flag and class.
 Group 2—Commander Y—*Paulding*—flag and class.
 Group 3—Commander Z—*Bainbridge*—flag and class.
 Group 4—Commander W—*Ammen*—flag and class.
 Group 5—Commander T—*Alwyn*—flag and class.

SUBMARINES.

Group 6—Lieut. Commander S—*K1, K2, K3, K4, K5*.
 Group 7—Lieut. Commander R—*F1, F2, F3, F4, G4*.

TRAIN.

Admiral J commanding.

Olympia, flag.*Panther*, } repair ships.*Iris*,*San Francisco*, mine layer.*Solace*, } hospital ships.*Relief*,*Celtic*, } supply ships.*Culgoa*,*Glacier*,

<i>Jason</i> (10,500 tons of coal),	} colliers.
<i>Orion</i> (10,500 tons of coal),	
<i>Proteus</i> (10,500 tons of coal),	
<i>Nereus</i> (10,500 tons of coal),	
<i>Vulcan</i> (7,200 tons of coal),	
<i>Hector</i> (7,200 tons of coal),	
<i>Cyclops</i> (10,475 tons of coal),	
<i>Jupiter</i> (10,475 tons of coal),	
<i>Neptune</i> (10,475 tons of coal),	
<i>Mars</i> (7,200 tons of coal),	

Decision.—The efficiency of the shore defenses during a night engagement is limited by the number, power, and efficiency of its searchlights. Generally speaking, since only illuminated targets can be attacked, the gun power of the defense is limited by the number of available lights. At night the range of the guns is limited to the range of efficient illumination, which varies from night to night with the atmospheric changes and depends largely upon the sighting of the lights in question. While the attacking fleet finds difficulty in navigating strange and often narrow channels, it is believed that the difficulties of a night attack are more than compensated for by the reduction in the efficiency of gun fire due to the guns depending upon the searchlights.

An examination of the accompanying chart shows that Durazzo Island is surrounded by coral reefs, and that it offers but few landing places suitable for large bodies of troops. Appreciating this condition, and realizing that the Black Fleet is not accompanied by any mobile army troops, and that any large landing parties drawn from the fleet for the purpose of attacking the defenses from the land side would seriously handicap the fighting efficiency of his fleet, Admiral Brin's general plan of attack, after reconnoitering and establishing his base in Charity Bay, will be to make a careful reconnaissance of

the defenses, to be succeeded by a similar reconnaissance at night for the location of the searchlights. Having definitely located the latter, he will persistently endeavor by repeated minor engagements to destroy the searchlights, and after clearing a passage through the mine fields, force an entrance into the waters of the inner harbor.

BLACK'S LINE OF ACTION.

Base.—Selection of Charity Bay as an advanced base, detachment of First Destroyer Group and Seventh Division to reconnoiter and hold same. This will properly involve landing on each island several small officers' patrols. An elaborate and careful search must be made by day and night for submarine mines, signal stations, cables, or any means of defense or offense. Commander C detailed as base commander.

Fleet orders announce the location of the following rendezvous:

Rendezvous A—20,000 yards due north of Fort Cotton.

Rendezvous B—10,000 yards northeast of Fort Cotton.

The station of the independent flagship will be at rendezvous A, to which place all information will be sent.

Blockade.—To prevent ingress or egress of hostile vessels, the main entrance will be immediately blockaded, a blockade proclamation issued, and the Second Division will be detailed to establish the blockade.

The blockading division will be relieved daily. It will endeavor by constant movement and sallies to retain the artillery garrison at its fighting stations, allowing them as little uninterrupted rest as is possible.

Reconnaissance, day.—Reconnaissance for—

(1) Landing places not in field of fire, for location and destruction of commercial cables (if possible the latter should be affected at the earliest possible moment). Detail of Fifth Division for this purpose.

(2) Discovery of naval vessels in harbor. Detail of First Group submarines (awash) to enter Boca Grande and endeavor to penetrate the naval port, reporting any information to rendezvous A.

(3) Location of military resources of port by landing of officers' patrols. Four officers' patrols to be landed in small boats from First Division. Information to be reported to rendezvous A.

The foregoing disposition to be commenced during the first night.

Upon receipt of reports of the reconnaissance, the following additional moves will be made:

Reconnaissance for the purpose of—

(a) Verifying location, caliber, and areas of fire of known batteries and for developing the position of any heretofore unknown.

(b) Location of position, finding stations, radio, or other signal stations.

(c) Selection of aiming points.

(d) Location and placing of buoys for the estimation of ranges and for marking safe avenues of approach.

To accomplish these ends it is essential that the Black fleet engaged be of sufficient strength and that it approach in such a manner as to cause the defenders to open fire. For this purpose the First, Second, Third, and Fourth Divisions will operate as shown on the accompanying chart. While endeavoring to draw the fire of the shore defenses, the divisions will approach no nearer to the defenses than is necessary, and ammunition will be expended only for useful purposes. During the approach of the battle fleet the First and Second Groups of Submarines (awash) will reconnoiter Boca Grande and Boca Chica, respectively, for the purpose of determining the location of the mine fields and the position of the mine defense guns.

Upon the completion of these maneuvers each division commander will report his conclusions and observations to the chief of staff at rendezvous A.

As a result of this reconnaissance the shore defenses will be subdivided into areas, whose limits can be readily recognized from the sea. The dimension parallel to the sea front of each area to be, if practicable, about 600 feet. The sections will be numbered consecutively from right to left. They will be referred to by number when assigned to individual ships as targets.

Reconnaissance, night.—Upon the first favorable night (a foggy or rainy one by preference), a reconnaissance for the location and destruction of the searchlights will be conducted. Each division will detail one ship's steamer, provided with two hooded lights in vertical line, to locate shoals and turning points. These mark boats will report to Commander K and be anchored by 1.30 a. m. in positions to be selected by him.

The First, Third, Fourth, and Fifth Divisions will report at rendezvous B at 2 a. m. An endeavor will be made to impress the enemy with the danger of an impending passage of the entrances, thereby drawing into action all searchlights.

Raids.—The attack on the searchlights will be continued nightly until by their destruction the efficiency of the defenses has been materially reduced, and repeated raids will be made to clear Boca Grande and Boca Chica of mines by dragging and sweeping the channels, using available destroyers and submarines. In case any mines are destroyed, or if the defense attempts to replace or repair the mine fields, the commander of the blockading division will open fire on any mine laying vessels. For this purpose, at night the blockading division will close in so as to be just beyond the range of efficient illumination, probably 8,000–9,000 yards, retiring during daylight so as to be just beyond the effective range of the guns of the defense.

Each division will be assigned to a section, and will endeavor to destroy the searchlights therein by rapid fire. This attack on the searchlights will be supported by a raid on the mine field to be made by the Third and Fourth Destroyer Group and the First and Second Submarine Group (awash). Each vessel of the raiding groups will trail astern a grapnel at 60 fathoms of cable. They will enter Boca Chica and if possible return via Boca Grande. Upon the completion of this maneuver the commanders of divisions will report the result of operations to the chief of staff at Rendezvous A.

To summarize, Admiral Brin's action will be:

- (a) Selection and reconnaissance of advanced base.
- (b) Establishment of blockade.
- (c) Reconnaissance of island—cable cutting.
- (d) Reconnaissance of naval harbor.
- (e) Day reconnaissance of shore defenses.
- (f) Night reconnaissance of searchlight positions.
- (g) Raid on mine fields.
- (h) Continued attacks on searchlights and mine field raids.
- (i) Runby.

CHAPTER IV.

NOTES ON ARMAMENT AND ACCESSORIES.

I. LOCATION OF FORTIFICATIONS.

Considering the continental position of the United States and recognizing the importance of the Navy as the first line of defense, fortified ports are divided into two classes:

(a) Those which from a naval point of view are of strategic importance for successful operation of the fleet, are called "ports of the first importance."

(b) All others, which the national policy requires to be fortified, are called "ports of secondary importance."

1. *General considerations.*—There are certain general considerations which govern the selection of the site of any coast fortification (i. e., group of batteries). These may be enumerated as follows:

(a) The particular site must be selected with reference to some "raison d'être." It may be chosen to protect a naval base (Fort Monroe), to deny to the enemy the use of some inland water or sheltered roadstead (Cape Henry), to protect a commercial center (Portland), to cover strategic lines of railways (Narragansett), etc., but in each case its location must be such as to compel the enemy to attack it before gaining possession of the naval base, inland waterways, etc.

(b) The site chosen must be sufficiently advanced to prevent the hostile fleet from effectively bombarding the place protected unless the ships are subjected to the fire of the fortifications.

(c) The constituent elements (i. e., the individual batteries) should be mutually supporting, so that they can not be fought and silenced in succession.

(d) The batteries, while concentrated so as to permit of grouping for purposes of fire control, must be sufficiently dispersed to deprive the ships of the advantages of concentration of fire.

(e) A clear field of view of the water area to the front and flanks is essential.

(f) In the selection of any particular site, due and careful consideration should be given to landward defense, as an attack from that side is more likely than from the seaward front. For this reason, other considerations being equal, available islands offer many attractions.

(g) The general question of the location of the necessary adjuncts (i. e., mine fields, available base lines, and effective searchlights) should be fully considered before the particular sites for the individual

batteries are decided upon. Small islands limit the choice of horizontal base stations and effective searchlights positions.

(h) Fortifications should be located so as to be most economically supplied and effectively administered. This condition will largely affect the fighting efficiency on account of its direct bearing on drills, tactical exercises, and maneuvers.

2. *Choice of calibers.*—The armament of the coast fortifications of the United States may be classified as:

Fixed, with permanent emplacements.

Mobile, for repelling land attacks.

The fixed armament may be further subdivided as follows:

(1) Primary, i. e., guns of 8-inch and larger caliber, including 12-inch mortars.

(2) Intermediate, i. e., 6-inch, 5-inch, and 4.7-inch guns.

(3) Secondary, i. e., 4-inch and 3-inch guns.

This multiplicity of designs, which is objectionable, is the result of a gradual development of the present accepted types of gun and carriage.

In the present state of development the type gun of each class is:

Primary, 12-inch or larger, 12-inch mortars.

Intermediate, 6-inch guns.

Secondary, 3-inch guns.

The choice of calibers for any particular site depends directly upon the object of the fortification and its character. For the defense of a narrow river, as the Potomac or Delaware or Cape Fear, a mine field protected by 6-inch rapid-fire guns would be adequate.

The increased power and rapidity of fire of the latest models of the 6-inch rapid-fire guns obviates to a great degree the use of the older models of the 8-inch and 10-inch guns. In addition to supplementing at short ranges the primary armament, 6-inch guns are used to protect distant mine fields.

The 3-inch gun is used against torpedo craft and light cruisers and is employed for the protection of the normal mine field.

The defenses of ports of the first importance with entrances of moderate width usually include guns of 12-inch caliber or larger, which are particularly adapted for attacking the heaviest ships, while for the protection of wide channels, such as exist at the entrance to Long Island, Manila Bay, and Panama, the 14-inch gun is peculiarly suited.

Mortar batteries were originally designed to fire at fixed targets and were formerly expected only to cover anchorages from which a bombardment might be expected. However, with improvements in the gun, carriage, and methods of fire control the accuracy of fire from mortar batteries has been greatly increased, and they are now considered as one of the most important elements of the defense. The fact that their fire is particularly effective at long ranges against the

weakest part of a ship, i. e., the protective deck, supplements at extreme ranges the diminished penetrative effect of the other guns of the primary armament.

The all-round fire obtainable from this class of battery is particularly valuable in covering the dead sectors of other types of batteries protecting interior waters and for effective land defense.

3. *The number of guns required.*—From time to time many authorities have given rules for determining the number of guns required for the adequate defense of any given port. These rules were generally based upon empirical formulæ, usually that one gun ashore was equal in efficiency to x guns afloat. None of these rules have proved satisfactory, and the dictum now accepted is that an adequate defense is provided “if the armament will compel the enemy to land in order to effect a capture”; “that it has fulfilled its functions, and any increase in armament thereafter is an unwarrantable expense in material and personnel.”

Eliminating from consideration those comparatively narrow rivers which may be effectively defended by mine fields protected by rapid-fire batteries, it is not an easy question to determine with mathematical precision the exact number of guns required for the adequate defense of a given locality, but by assuming the emplacement of a given number of batteries of stated caliber it is possible by use of the Coast Artillery War Game to determine the number of vessels that may be fairly assumed as rendered *hors de combat* by them.

II. LOCATION OF BATTERIES OF THE PRIMARY ARMAMENT.

Having chosen the general site for the fortifications from a consideration of the principles laid down above, the particular site for an individual gun battery of the primary armament should be selected.

(a) If possible the axis of the principal channel of approach and the normal line of fire should make an angle of 30° at a range of 6,000 yards.

(b) Moderate height of site is desirable, facilitating observation of fire, position finding, and concealment. Spotting surfaces in front and shell catchers immediately in rear should be avoided.

(c) Concealment; to lessen liability to injury, to increase difficulty of silencing the guns, and to increase the efficiency of fire through calmness given to gunners.

(d) Fire commands of four batteries each should contain guns of the same offensive value, i. e., guns of the same caliber. Guns and mortars should never be in the same fire command.

(e) Avoid unnecessary stretches of sandy beach in front of battery, as the heat waves arising therefrom on a bright sunny day may seriously affect the accuracy of fire.

(f) Each battery of primary guns should have a clear field of at least 15,000 yards, or a portion of its inherent power will be lost.

Mortar batteries should:

(g) Cover main channel of approach with minimum number of effective zones.

(h) Be concealed from view if possible.

(i) Utilize their all-round fire to cover inland waters, and be capable of use for defense of land forts.

(j) Be retired from shore line so as to have as little as possible of minimum ineffective zone over important water areas.

III. LOCATION OF GUNS OF THE INTERMEDIATE ARMAMENT.

In selecting sites for guns of the intermediate armament, it must be borne in mind that their object is to attack unarmored vessels, to support the primary armament in the attack of armored vessels, and to protect mine fields at long range. The most important of these is the protection of distant mine fields, as our system of defense is built upon the hypothesis that modern battleships with high speed and heavy armor can, under certain circumstances, successfully run by shore batteries if the channel is not effectively closed by mine fields. Hence the defense of the mine fields is of first importance. As the conditions governing the selection of sites for the guns of the intermediate armament are not of such number nor so severe as those in controlling the location of the primary armament, the latter should have the first place. The following conditions should, however, be fulfilled:

(a) To bring an effective rapid fire on the defense mine field (4,000 yards).

(b) Not to obstruct the field of fire of the primary armament.

(c) To be concealed.

(d) To have sufficient height for observation of fire.

(e) To be grouped in fire commands.

IV. SEARCHLIGHTS.

1. *Classification.*—The standard service searchlights are 36-inch (for mine fields) and 60-inch, but there are several of the 24-inch and 30-inch lights still in use. Searchlights are classified as:

Fixed,

Roving, and

Illuminating.

Fixed lights are used to keep illuminated the outer limit of the battle areas, the beam being moved but little in azimuth, and given an oscillatory motion up and down so as to cover all water area between it and the extreme range of illumination.

Roving (or searching) lights are for the purpose of obtaining information of the approach of the enemy at the earliest practical

moment. They are also used for searching the battle area within the fixed beams.

Fixed and roving lights are usually retained under the battle commander's control.

Illuminating lights are intended primarily for illuminating targets assigned to fire commands, and are usually controlled by fire commanders.

Mine lights, usually 36-inch, are used under direction of the mine commanders for searching the mine field and illuminating targets therein.

On special occasions battle illuminating and mine lights may receive special assignments from the battle commander.

2. *Personnel*.—Each searchlight (excluding the engineers and firemen whose numbers depend upon the source of power) requires for efficient use the following personnel:

1 operator.

1 watcher.

1 assistant.

1 telephone operator.

(NOTE.—If illuminating lights are to receive assignments as roving lights, they should have watchers and telephone operators.)

The watcher, who should be an especially intelligent man with excellent vision (determined by surgeon's examination), well instructed in the hydrography of the coast defense command and with the various types of warships, is posted about 150 to 200 yards on the outside of his light.

CHAPTER V.

TYPE FORMS OF NAVAL ATTACK AGAINST A COAST FORTRESS.

During recent wars there has been but little experience gained in the seaward attack and defense of fortified harbors.

The progress of the development of naval construction, naval ordnance and rapidity and efficiency of long-range naval gunfire has all tended toward a marked reduction in the heretofore claimed superiority of the shore defense. One prime cause contributing continually to this end is that, while warships are ever increasing in offensive and defensive power and the older types of battleships are relegated to the scrap heap, once considerable sums of money have been invested by a nation in its coast defenses, there is no gradual replacing of the older models of guns and carriages by new types, or at least there is no replacement until the armament has become thoroughly antiquated. Consequently to-day we see battleships of 1910 and later years opposed to coast defense armament with guns of 1888, 1895, and 1900.

Recent naval wars, while failing to yield any engagements between ships and forts, have afforded many examples of the damage resulting from naval engagements between armored ships, and important conclusions may be indirectly drawn as to the amount of damage ships can stand from gunfire and still be seaworthy. Some writers had heretofore claimed that three 12-inch hits would disable a battleship, but the appended table shows that armored ships have received as many as twelve 12-inch hits and still been sufficiently seaworthy to escape by flight.

GENERAL DEFENSE PLANS.

Drill Regulations, Coast Artillery, paragraph 567, require that the battle commander "by careful study of his battle area and consideration of the location and strength of his fire and mine commands * * * prepare plans of defense to be used against the forms of attack liable to be adopted by an enemy."

The preparation of these general defense plans is one of the most important duties of the battle commander, and their preparation has been the subject of valuable articles by several able artillery officers.

Before preparing them, however, it is essential that clear ideas should be held, by those charged with their preparation, on the type forms of naval attack that may be expected.

Naval attacks on coast fortifications may be classified as follows:

Reconnaissance.

Raids.

Runbys.

Bombardments.

Blockades.

Reconnaissance.—The coast artillerist is apt to assume that his naval opponent has as intimate knowledge of the strength and location of the batteries and their adjuncts as the fort commander has himself. Such assumption, it is needless to say, is entirely unwarranted. While the naval commander must undoubtedly have certain information relating to the armament of the place to be attacked, such information must of necessity be far from complete. Eliminating from consideration for the present all the attacks in the nature of a surprise, similar to the destroyer raid on Port Arthur on February 8, 1905, any serious campaign against a coast fortress will be commenced by some form of reconnaissance, but with the understanding that if the fortress is taken unawares the attack will be pressed home with utmost vigor.

A reconnaissance may be for any one of the following purposes:

(a) To locate the position, arcs of fire, dead angles, etc., of the batteries.

(b) To locate the position of range-finding stations, base-end stations, searchlights, etc.

(c) To locate mine fields.

(d) To locate searchlight positions.

(e) To locate landing places for mobile troops.

(f) To determine the naval resources of the defended port.

For the purpose of locating the position of the batteries, etc., it will usually be necessary for the attacking fleet to show sufficient strength and to act so as to draw the fire of the defense. To this end powerful armored vessels, probably fast battleships, armored cruisers, or coast-defense vessels (if available), will be used. For the attack to accomplish the best results the fortress commander must be led to believe that a run-by is pending. The attack may be supported by a bombardment.

To locate the position of the range-finding stations, base-end stations, etc., small fast cruisers, destroyers, or possibly submarines (awash) may be employed. It is not unlikely that small patrols may be landed with a view to supplementing information obtained from other sources.

To locate mine fields, destroyers or submarines (awash) may be used.

To locate searchlights, fast vessels, cruisers or destroyers, or submarines may be used, the attack being supported by a bombardment beyond the illuminated areas.

To locate landing places for mobile troops, which may or may not be in the field of fire, destroyers, small cruisers, or steam launches may be employed.

To determine the naval resources of the defended port, it may be necessary to effect the passage of the fortifications at night, in which case submarines (awash) may be used. Small patrols landed from the attacking fleet can supplement the information obtained in other ways.

Raids.—The reconnaissance (or other means) having supplied the naval commander with the requisite knowledge of the defensive resources of the fortified port, he is now enabled to lay his plans of attack. In the discussion that follows it is assumed that the attack is to be made from the seaward side. A harbor fortified in accordance with the present state of the science of coast defense is usually closed by submarine mines, and no successful run-by into the interior waters will be attempted until an opening has been made through the mine field. To prevent this being done, the field is lighted by searchlights and protected by rapid-fire guns. If the searchlights can be destroyed by gunfire, attempts can be made to open, by sweeping, creeping, and countermining, a passage through the field. It is generally conceded that gun fire alone can not successfully prevent the passage of fast armored ships.

Hence the probable line of attack of the naval commander will be to destroy the searchlights and the base-end stations. The former will permit of the mine field being cleared and the latter will reduce the efficiency of gunfire of any supporting batteries. The operations by which the searchlights and base-end stations are destroyed are called "raids."

In raids against searchlight stations, fast cruisers or destroyers may be used, fast vessels armed with rapid fire guns being the essential requirements. These raids may be supported by a bombardment of the position by having ships beyond the range of effective illumination.

In raids against mine fields, destroyers, mine sweepers, submarines (awash), or steam launches may be used, and it is essential that the attention of the defense be drawn to other parts of the battle areas by feints.

Run-by.—A runby is much more likely to occur in certain harbors than others. For example, wide, deep entrances leading to large interior waters, such as Puget Sound or San Francisco Bay, in foggy weather invite this form of attack.

The particular formation adopted by the hostile fleet is one of great moment to the battle commander in preparing his general defense plans. The most advantageous formation, from the attacker's point of view, can only be decided after a careful study of the chart, but it may be safely assumed that an enemy will assume that formation for his fleet which will put the shore defenses to the greatest disadvantage. Line ahead, permitting concentration of fire on the leading ship, is probably the best formation from the defense point of view, and is consequently the least likely of adoption, if other formations will be permitted by the hydrography of the channel.

CHAPTER VI.

BATTLE COMMANDER'S ESTIMATE OF THE SITUATION.

The object of this problem is to apply, in so far as it may be possible, the principles which govern the preparation of field orders to any orders an artillery commander may find necessary to issue to cover a tactical situation.

While the "estimate of the situation" by the battle commander is one that has been but lightly treated by military writers, and references bearing thereon are comparatively scarce, nevertheless it is believed to be one that can well bear full and careful investigation.

Paragraph 567, Drill Regulations, Coast Artillery, 1909, states: "He (the battle commander) commands the fire action from his station, from which the whole battle area and the approaches thereto should be visible," and again, "By careful study of his battle area and consideration of the location and strength of his fire and mine commands he prepares plans of defense to be used against the forms of attack liable to be adopted by an enemy. While it is not practicable to anticipate all the conditions that will arise during an engagement nor all methods of attack that might be adopted by an enemy of initiative and resource, there are certain forms of attack which may be anticipated and for which a single command from the battle commander will be sufficient to start all or part of the units of his command to defeat the object of the enemy, leaving the battle commander free to observe the progress of the engagement and determine at comparative leisure how best to inflict the greatest injury upon the enemy while preventing the object of the attack."

Unless he understands the actions of his opponent, he may fail to utilize his resources in the best tactical manner. For example, the naval commander, on first appearing before the fortress, will naturally lend his first efforts toward verifying such information as to the strength of the defenses as may have been collected by his general staff in time of peace. Such information must of necessity be deficient in many particulars. Hence he will reconnoiter the water area with a view to disclosing the position of the batteries, etc., endeavoring at long range to draw the fire of such batteries as may be readily visible and also discovering those which are well concealed or have recently been constructed.

The battle commander, if he appreciates the intentions of his opponent, will endeavor to draw him on until he is well within range

of the primary armament so that he may be subject to a heavy fire, but failing in such appreciation, he may open fire with his guns at extreme range, thereby furnishing the attack with exactly the information desired and supplying it under circumstances least hazardous to the ships.

Again, he has the landward as well as the seaward defense of the coast defense command to consider. The naval commander may make a reconnaissance by day (or night) to draw the attention and fire of the batteries, for the express purpose of covering the landing of a detachment with a view to capturing the batteries from the rear. In such a case, unless the battle commander accurately estimates the intentions of his opponent, he may find his attention entirely diverted by the feint, thereby missing the main attack.

In a similar manner, many other situations can be presented showing the necessity for an artillery commander to draw certain tactical conclusions from the movements of the fleet within the battle area.

During the Coast Artillery war game course frequent occasion will arise when the battle commander must form tactical decisions. This operation may be divided as follows:

- (a) Estimating the situation.
- (b) Forming a decision or plan.
- (c) Giving the necessary orders to carry out this plan.

Before estimating the situation the following considerations should be carefully weighed:

- (1) The mission of the defenses.

Some fortifications are located to defend naval bases, others to protect commercial centers or to deny to hostile ships the use of certain interior waters, etc. A careful study of each locality will reveal what particular form of naval attack is most likely to succeed and consequently most to be feared by the defense, and while the mission of the defense is to defeat all forms of attack, the commander should be constantly on the watch for that particular one most likely to succeed.

- (2) The character, number, and formation of the approaching ships.

These considerations will often guide the battle commander in deciding what the enemy's plans are.

- (3) Their speed and course.

These will determine the length of time the vessels will be subject to fire.

- (4) The hydrography of the harbor with reference to their possible movements.

- (5) The angle of presentation.

- (6) Probable intentions.

- (7) Amount and kind of ammunition.

- (8) Location and character of fire commands.
- (9) Location and state of efficiency of mine commands.
- (10) Number and state of efficiency of searchlights.
- (11) State of weather, wind, and tide.

The battle commander should now consider the different courses open to him, with the advantages and disadvantages of each, and be ready to come to a clear, definite decision as to the best method of defense. This is called "estimating the situation."

Objection is often raised to this process on the ground that it is too long, too academic, and only suited for map problems. These objections are not well taken. They might be if it were contemplated to write a statement during the hurry of action, but such is not the case. The mind works rapidly in accustomed channels. What may be a slow and laborious mental process at first can be quickly accomplished by practice. During the war-game course it is proposed to "estimate the situation" first by preparing a written statement and finally when the process is thoroughly understood to require only a rapid mental one.

The next step is to form a decision, and to do so promptly. The time of action will be short, for in no other form of land attack will targets move with such great speed and be subject to fire so short a time. The whole tendency of the peace training of the Coast Artillerist is to make him slow and accurate, but his decision once formed, prompt, swift, and vigorous execution is demanded.

APPENDIX I.—List of lighthouse tenders, revenue cutters, coast defense, and harbor service boats.

[From data furnished by the Coast Artillery Division, Office of Chief of Staff, Apr. 10, 1912, and report of the Lighthouse Board, 1911.]

Coast defenses.	Vessel.	Class.	Length.	L. H. dist.	Vessel.	Class.	Tons.	Length.	Draft.	Off.	Men.	Guns.	Station.
Portland.	Wilson ¹	Q. M. Boat.....	110	1	Hibiscus ¹	Tender.....	677	173½	13½	6	22	.....	Portland, Me.
	Randol ¹	Dist. Boat.....	98		Lalae ¹.....	.....do.....	434	145	13	5	19	.....	Do.
	Drew.....	Launch.....	60		Myrtle ¹.....	.....do.....	348	130	13	4	16	.....	Do.
	Ramsay.....	.....do.....	30		Woodbury.....	Cutter.....	2 500	146½	.....	.....	.....	1	Rockland, Me.
	No. 24.....	D. B. L.....	32		Androsoggin.....	.....do.....	2 1,270	210	.....	.....	.....	4	Portland, Me.
Portsmouth.	Grubbs.....	Launch.....	60	32	.....	.....	.....	.....	.....	.....	.....	.....	.....
	No. 27.....	D. B. L.....	32		.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston.	Jesup ^{1,3}	Q. M. Boat.....	130	2	Anemone ¹	Tender.....	677	173½	13	6	22	.....	Boston, Mass.
	Anderson ¹	Dist. Boat.....	98		Azalea ¹.....	.....do.....	2 500	145	10	5	19	.....	Do.
	Bumpus.....	Launch.....	60		Mayflower.....	.....do.....	572	155	8½	6	22	.....	Do.
	Sehenek.....	.....do.....	65		Zizania.....	.....do.....	417	150	9	5	19	.....	Do.
	Mitchell.....	.....do.....	45		Acushnet.....	Cutter.....	2 769	152	.....	.....	.....	2	Woods Hole, Mass.
New Bedford.	De Hart.....	.....do.....	40	32	Gresham.....	.....do.....	2 936	205½	.....	.....	.....	4	Boston, Mass.
	No. 25.....	D. B. L.....	32		Winnimmet.....	.....do.....	2 174	96½	.....	.....	.....	.....	Do.
	Hartshorne.....	Launch.....	60		.....	.....	.....	.....	.....	.....	.....	.....	.....
New Bedford.	No. 31.....	D. B. L.....	32	32	.....	.....	.....	.....	.....	.....	.....	.....	.....

Narragansett Bay.	Drum.....	Tug.....	83	3	Daisy.....	Tender.....	35	74	6	2	4	.....	Tompkinsville, N. Y.
	Smith.....	.....do.....	65		Gardenia.....	.....do.....	150	117	8	4	11	.....	Do.
	Arnold ¹	Dist. Boat.....	98		Iris ¹.....	.....do.....	428	142	10	5	19	.....	Do.
	Downes.....	Launch.....	60		Jno. Rodgers ¹ (side wheel).	.....do.....	200	131	8	4	16	.....	Do.
	No. 30.....	D. B. L.....	32		Larkspur ¹.....	.....do.....	685	102	11	6	22	.....	Do.
Long Island Sound.	Greene ¹	Q. M. Boat.....	130	3	Mistletoe ¹ (side wheel).	.....do.....	352	153	7	4	16	.....	Do.
	Brannan ¹.....	.....do.....	98		Pansy ¹.....	.....do.....	314	147	7½	4	17	.....	Do.
	Ayres ¹	Dist. Boat.....	98		Tulip ¹.....	.....do.....	677	173½	13½	6	24	.....	Do.
	Rowell ¹.....	.....do.....	86		Woodbine ¹.....	.....do.....	62	86	4½	.....	.....	.....	Do.
	No. 26.....	D. B. L.....	32		Calumet.....	Cutter.....	2 109	94½	.....	.....	.....	.....	New York, N. Y.
Eastern New York.	Johnston ^{1,3}	Q. M. Boat.....	130	3	Hudson.....	.....do.....	2 174	96½	.....	.....	.....	2	Do.
	Augustin.....	Launch.....	60		Mohawk.....	.....do.....	2 980	205½	.....	.....	.....	4	Do.
	Lewis.....	.....do.....	59		Guide.....	.....do.....	2 32	70	.....	.....	.....	.....	Do.
	Hazlett.....	.....do.....	33		Seneca.....	.....do.....	2 1,480	204	.....	.....	.....	.....	Tompkinsville, N. Y.
	Hamilton.....	.....do.....	30		Manhattan.....	.....do.....	2 174	102	.....	.....	.....	.....	New York, N. Y.
Southern New York.	No. 29.....	D. B. L.....	32	32	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Meigs ^{1,3}	Q. M. Boat.....	132		.....	.....	.....	.....	.....	.....	.....	.....	.....
	Williams.....	Lighter.....	145		.....	.....	.....	.....	.....	.....	.....	.....	.....
	Canby.....	.....do.....	97		.....	.....	.....	.....	.....	.....	.....	.....	.....
	Brown ¹	Dist. Boat.....	98		.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern New York.	Connell.....	Launch.....	60	32	.....	.....	.....	.....	.....	.....	.....	.....	.....
	No. 15.....	D. B. L.....	32		.....	.....	.....	.....	.....	.....	.....	.....	.....

¹ Available for mine planting in case of hostilities.² Displacement.³ Q. M. boats not under control of coast defense commander.

APPENDIX I.—List of lighthouse tenders, revenue cutters, coast defense, and harbor service boats—Continued.

Coast defenses.	Vessel.	Class.	Length.	L. H. dist.	Vessel.	Class.	Tons.	Length.	Draft.	Off.	Men.	Guns.	Station.
Delaware.	{Howe..... Crosby..... No. 32.....}	{Q. M. Boat..... Launch..... D. B. L.....}	{75 40 32}	{4 }	{Sunflower ¹ Wissahickon.....}	Tender..... Cutter.....	2 797 2 174	163 96½	11½	6	22	.....	Philadelphia, Pa Do.
Baltimore.	{Carroll..... Wetherill ¹ Gregg..... No. 33..... Swartwout..... Wilhelm..... No. 28..... Reno..... Sater..... No. 1.....}	{Q. M. Boat..... Dist. Boat..... Launch..... D. B. L..... Q. M. Boat..... Launch..... D. B. L..... Tug..... Launch..... D. B. L.....}	{110 86 60 32 110 60 32 96 42 32}	{5 }	{Holly (side wheel). Jessamine ¹ (side wheel). Juniper ¹ Maple ¹ Orchid..... Thistle ¹ Aster..... Guthrie..... Apache..... Colfax..... Itasca..... Chase (bark)..... Pamlico..... Onondaga.....}	Tender..... do..... do..... do..... do..... do..... do..... Cutter..... do..... do..... do..... do..... do..... do.....	367 257 84 392 677 32 870 2 126 2 664 2 486 2 839 2 520 2 408 2 936	166½ 146 90 155 173½ 60 163½ 88 188½ 179½ 189½ 148½ 158 205½	8½ 7½ 5½ 9½ 13 7½ 10	4 4 2 6 6 2 4	16 16 4 22 22 4 ..... ..... ..... ..... .....	..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... .....

[illegible]

Available for mine planting in case of hostilities.

2 Displacement.

3 Q. M. boats not under control of coast defense commander.

Mine planters.—Atlantic coast—Mills, Schofield, Ord, Frank. Pacific coast—Armistead, Ringgold. Philippines, Hunt, Knox.

Ship.	Class.	Tons.	Flag.	Launched.	Date of battle.	Hits.						Remarks.
						12- inch.	8- inch.	6- inch.	5- inch. ¹	4- inch.	6- pounder.	
Chen Yuen.....	N.....			Chinese.....	1882							Withdrawn. Sunk by gun fire.
King Yuen.....	B.....			do.....	1887							Do.
Chih Yuen.....	F.....			do.....	1886							Ran aground. Badly damaged.
Yung Wel.....	F.....			do.....	1881			15				Withdrawn damaged and in flames. Was rammed and sunk by Tsi Yuen (Chinese).
Chao Yung.....	F.....			do.....	1881							Withdrawn damaged and ran aground.
Kuang Chia.....	F.....			do.....				4				Withdrawn. Converted merchant ship.
Saikio Maru.....	F.....			Japanese.....	1875			11	10			Do.
Matsushima.....	F.....			do.....	1890			4	?			Do.
Itsukushima.....	F.....			do.....	1889			3	?			Do.
Reina Cristina.....	F.....	3,520	Spanish.....	1886	May, 1898.		5		18		16	Probably more hits. Estimated 70. Put out of action and then sunk by crew.
Castilla.....	F.....	3,342	do.....	1881	do.....		3	2	16		19	Probably more hits. Put out of action and then sunk by crew.
Don Antonio de Ulloa.....	F.....	1,130	do.....	1887	do.....		4	3	15		11	Probably more hits. Sunk by holes along water line.
Don Juan de Austria.....	F.....	1,130	do.....	1889	do.....		2		4		7	Complete record. Sunk by crew.
Isla de Cuba.....	F.....	1,030	do.....	1887	do.....				3		5	Do.
Isla de Luzon.....	F.....	1,030	do.....	1887	do.....							Do.
Velasco.....	F.....	1,152	do.....	1881	do.....			1			1	Probably all. Sunk by crew.
Marques del Duero.....	D.V.....	500	do.....	1875	do.....		1	1			3	Probably more hits. Sunk by crew.
General Lezo.....	G.B.....	524	do.....	1885	do.....						1	Probably all. Sunk by crew.
Vizcaya.....	B.....	7,000	do.....	1891	July, 1898.		5		7		13	Ran aground on fire.
Oquendo.....	B.....	7,000	do.....	1891	do.....		7		3	6	43	Do.
Maria Teresa.....	B.....	7,000	do.....	1890	do.....		3	1	3	1	17	Do.
Colou.....	B.....	6,840	do.....	1896	do.....	2	1	1	2		4	Ran aground and surrendered.
Iowa.....	A.....	11,340	United States.....	1896	do.....				2			Uninjured.
Oregon.....	A.....	10,288	do.....	1893	do.....				3			Do.
Indiana.....	A.....	10,288	do.....	1893	do.....				2			Do.
Brooklyn.....	B.....	9,215	do.....	1895	do.....			2	3		10	Went immediately in pursuit of another supposed enemy.
Texas.....	B.....	6,315	do.....	1892	do.....						1	Uninjured.

15 or 4.7-inch.

